

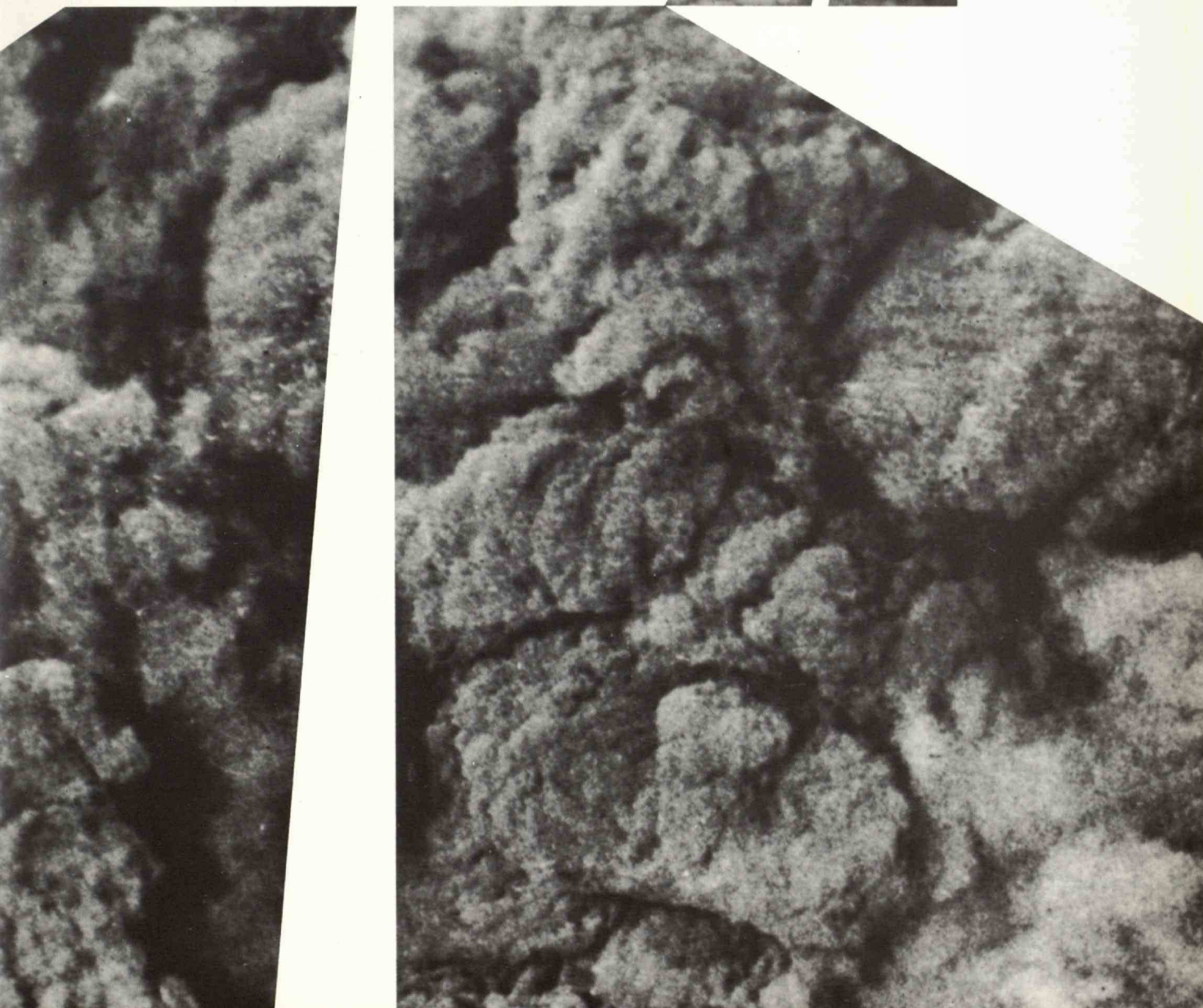
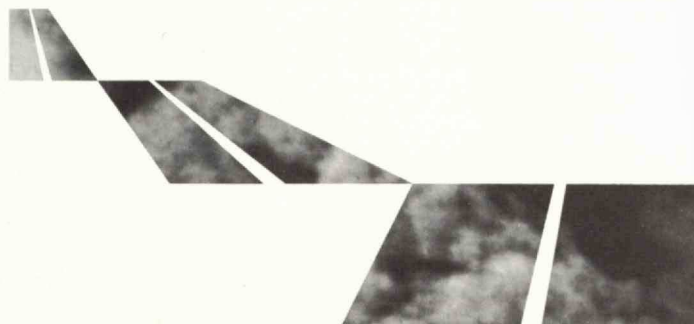
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Technology versus Tradition



Technology Review

Cleaning up Cars



technology review

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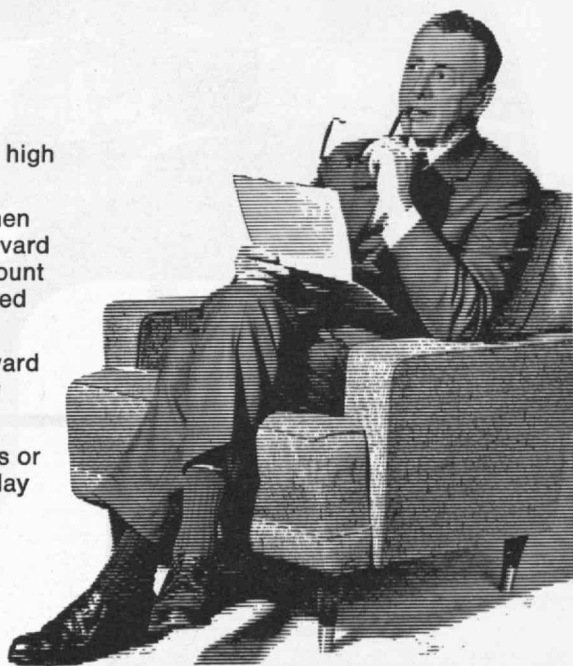
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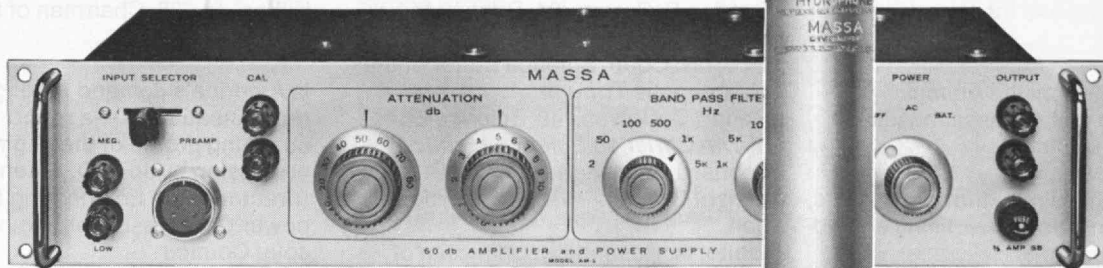
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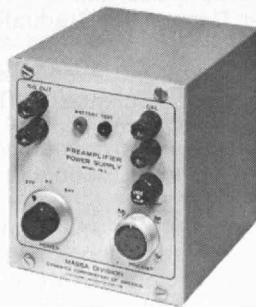
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Is America's demand for engineers really insatiable?—a report on the changing profile of the engineering profession by John D. Alden, '49, Director of the Engineering Manpower Commission of Engineers Joint Council

How pervasive is man's dependence on the 24-hour day? Dr. Richard J. Wurtman of the M.I.T. Department of Nutrition and Food Science describes new knowledge of mammalian metabolic regulatory systems

Are conflict and strife inherent in urban affairs? Arthur R. Steinberg of the M.I.T. Department of Humanities supports this theory with archaeological evidence from the world's oldest cities

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Government Review

Victor K. McElheny

From Pork Barrel to Industry

It may be that Massachusetts, and other states with large, established scientific communities, are worrying in the wrong way about competition with other states for research support from the United States government. This support has had such an important influence in the past that it is automatically assumed to be a key to an area's industrial future. The scientific pork barrel is assumed to be the most important pork barrel there is. But is it? It may be that thinking too simply about such competition may blind the leaders of a state like Massachusetts to the real problems, and the real opportunities. In the Boston area, apparently, there has been too much fear of the attempt to spread federal dollars around, too much emphasis on attracting new federal installations here and not enough concerted action to exploit, in a large-scale way, the industrial potentials created by the large investment already made in the Bay State by the U.S. government and private industry.

There are many observers who feel that federal scientific and technical programs have reached a plateau which they will occupy for some time. Indeed, the President's science adviser, Dr. Donald Hornig, noted in a talk to science writers last autumn in St. Louis that most of these programs reached their plateaus early in this decade, and that the rapid expansion of the space budget, now halted, was the one great exception which blinded many observers to what was going on. It is likely that the lesson of the leveled figures is that the great technological opportunities of the next 10 years lie in the civilian, industrial, even blue-collar exploitation of the techniques and devices which have been developed for the great programs in defense, atomic power, space and medicine. Massachusetts, because of a provincial self-consciousness bred of many economic disasters and a complacency bred by the sudden growth of its research and electronics industry, shows signs of failing to grasp these new opportunities as vigorously as she could.

In addition, the local leadership may be failing to notice problems which affect

the state's existing strongholds of research. Clearly, the contraction in defense research foreshadows problems for an establishment like Lincoln Laboratory, which has, in the past, faced the agonizing job of finding a new mission.

It is well known, for example, that the collection of radio and radar instruments at Millstone Hill, Mass., near Groton, has become an increasingly notable center of radio astronomy. From the military point of view, however, this is not quite the same thing as working on the problem of detecting incoming flights of real and phony intercontinental missiles, and it becomes difficult for the Department of Defense to justify the sort of round-the-clock operation for the radio dishes at Millstone Hill that is scientifically desirable. The result is that one of the most elegant radio and radar antennas in the country, the 120-foot radome-covered Haystack dish, has been on a 40-hour week for lack of funds.

Even before its surface accuracy was greatly improved last autumn, Haystack was doing valuable radar and radio work at 15,000 megacycles. Its range is now much higher, allowing among other things for much more refined studies of surface features on Mars and Venus. The indicated remedy for the situation at Millstone Hill would be to appeal to the nation's agency for supporting undirected basic research, the National Science Foundation. But N.S.F. has only limited funds for radio astronomy, as was indicated last summer when an N.S.F. panel reviewing proposals for large radio antennas gave its approval of immediate starts on only two, relatively inexpensive, projects (see *Technology Review*, Oct./Nov., 1967, p. 49).

Federal Funds for Massachusetts

The sheer distribution of federal research funds can hardly be called a problem in Massachusetts. Something near \$1 billion of these funds comes each year to the Bay State. Between fiscal year 1963 and fiscal year 1965, the last full year for which figures are available, the total of direct federal R & D obligations in Massachusetts (which gets about 80 per cent of all the money coming to New England) rose 40 per cent,

from \$515 million to \$734 million. In the same period, to be sure, the Texas total jumped 83 per cent, from \$398 million to \$731 million. But California's total rose only 6 per cent, from \$4283 million to \$4553 million, according to figures in the N.S.F. report, *Geographical Distribution of Federal Funds for Research and Development* (N.S.F. Publication 67-8).

But there are indirect allocations of federal funds as well. These are the so-called "first and second tier" subcontracts of which Massachusetts is a chief beneficiary (and California the main source). Such subcontracts come to the Bay State in great part because of its great concentration of research and electronics manufacture.

In fiscal year 1965, the National Aeronautics and Space Administration awarded \$62.3 million worth of "prime"—that is, direct—contracts and research grants to Massachusetts firms, educational institutions and nonprofit research centers. In the same year, Massachusetts organizations awarded \$3.5 million in subcontracts outside the state, while \$60.1 million worth flowed in—a net gain to the state of \$56.6 million.

The same fiscal year, the Defense Department obligated \$564 million in the state. According to a study by the Defense Department and the Atomic Energy Commission of 28 prime contracts worth just under \$2 billion, Massachusetts received \$61.5 million. This was a large share of the \$534 million worth of subcontracts which crossed state lines (prime contractors held onto \$1338 million and awarded \$119 million worth of subcontracts in their own states). No subcontract money flowed out of Massachusetts under the 28 prime contracts studied.

These studies indicate that Massachusetts received over \$120 million in first and second tier subcontracts in 1965. Although the state's net N.A.S.A. subcontract figure has shrunk—to \$24.5 million in fiscal 1967—it is possible that the Defense Department-Atomic Energy Commission figure has increased with increasing effort on antiballistic missile systems.

In the educational field, Massachusetts institutions have been holding their own strongly, in part because the funds allocated to basic research at universities have increased faster than the over-all research and development budget, and even more because federal funds for so-called "other academic science activities," besides research and development and research and development plant, more than doubled between fiscal years 1963 and 1966 (N.S.F. Publication 67-14, *Federal Support to Universities and Colleges*). The "other" activities include fellowship and traineeship programs now being cut back.

Over-all federal obligations for research and development at universities and colleges rose from \$813 million in 1963 to \$1258 million in 1966. Obligations for R & D plant rose little, from \$106 to \$115 million, while the other science activities funds jumped from \$393 to \$799 million. In the same period, nonscience obligations to higher education increased 10 times over, from \$85 million to \$847 million (see *Technology Review*, Dec., 1967, p. 48).

Such a situation of rising budgets is the only one in which support for established scientific institutions—preferred by government agencies with a mission to perform quickly—and the desire of many local representatives in Congress to spread the money around can be satisfied. This point appears to be sinking in. It is said that a realization in Congress that the strong institutions cannot be robbed to boost the weak ones lay behind the Senate rescue of the administration's budget request for the National Science Foundation last September, in the middle of a budget-cutting whirlwind.

While their percentage of the total research and development pie shrank slightly between fiscal year 1963 and fiscal year 1966, Harvard and M.I.T. both experienced solid increases. In the four-year period, M.I.T.'s total of federal R & D money went from \$46.6 million to \$57.2 million and Harvard's from \$23.3 to \$31.2 million.

This must be counted a fairly good performance in the face of years of Congressional outcry about the fact that

California, with only 8 per cent of the U.S. population and 12 per cent of the scientists, receives 32 per cent of the federal R & D money.

In fact, Massachusetts, with 2.76 per cent of the national population in the 1960 census, has 4.24 per cent of the scientists and engineers on N.S.F.'s 1965 register of scientific and technical personnel, and got 5.11 per cent of the federal R & D money during fiscal 1965.

Spreading the Funds and Facilities

Much of the worry about what might come of Congressional talk of sharing the scientific wealth comes from the mistaken notion that scientific appropriations do not follow the usual political rules of a great continental empire. It is assumed that the special circumstances of great defense and science programs, involving small groups of anonymous scientific counselors, have tended to keep the money in places favored by a scientific clique.

Certainly, the research and development money is highly concentrated. The top 100 institutions still received nearly 89 per cent of the R & D money in fiscal 1966. But many of these institutions are in parts of the country which did not exist as centers of research before the great government programs began in World War II. One need only point to such centers as Oak Ridge, Tenn., Albuquerque, N.M., Seattle, Wash., Tucson, Ariz., or Boulder, Colo., to appreciate the point.

The growth of the aviation and space industries during the past decade has fed the aviation plants of the state of California, but it has also benefited Texas and Oklahoma, and Louisiana and Florida. Some of the same southern states whose strength in Congress led to the creation of so many armed services training centers in World Wars I and II are now getting space age installations: a "moon port" in Florida, a rocket development center in Alabama, a rocket factory in New Orleans, a space-flight control center at Houston, a static firing facility in Mississippi. The pressures involved here do not involve the members of science advisory panels only. They are more reminiscent of those accompanying the construc-

tion of railroads and canals in the Nineteenth Century.

In such appeals to the national government, the state of Massachusetts seems to have done rather well—perhaps better than it has done in old-fashioned salesmanship and boosterism to offset the long decline of the textile and shoe industries, shipbuilding and fisheries. These problems involve a kind of concerted action in the private sector, with vigorous help from the state house, that seems to be lacking in Massachusetts (whose manufacturing labor force is the same absolute size it was 15 years ago).

It is true that the General Dynamics shipyard in Quincy has expanded its labor force greatly in recent years, and just before Christmas snagged an order for three advanced merchant ships as a step toward diversifying its business away from heavy reliance on orders from Washington. It is also true that Honeywell has concentrated its computer manufacturing in Massachusetts, bought out Computer Control Corporation, expanded its work force, added to its research facilities and emerged as a major manufacturer of large, as well as small, computer systems (the largest are only just coming on the market, but the value of Honeywell computers shipped from Massachusetts rose from \$200 million in 1965 to \$300 million in 1966 and a probable \$400 million in 1967). Both of these developments are encouraging signs that some Massachusetts eyes, at least, are focusing on the civilian, private, industrial sector of the economy. But more salesmanship is needed. Other computer manufacturers, notably Control Data Corporation, are considering moving to the Bay State center of electronics. But the activities of the state government agency for industrial development, the Department of Commerce and Development, are still focused on fostering the industry already here, not on attracting new strength from outside.

Victor K. McElheny is Science Editor of *The Boston Globe* and Contributing Correspondent of *Science Magazine*.

Standards for Our Environment

The trouble is we take our oxygen for granted. You want a little, so you breathe a little. But what if you inhaled and couldn't get enough?

Professor LaMont C. Cole of Cornell University thinks we may have to face that problem if we go on being ignorant of the basic facts of modern life. We need to know in quantitative terms just what the critical parameters are that determine the livability of our environment as our population presses ever more heavily upon it. The outlook for oxygen makes the point.

According to Dr. Cole, we're removing tremendous amounts of atmospheric oxygen by burning fossil fuels. At the same time, we're throttling down oxygen production by cutting back on vegetation. Heavily industrialized areas such as the United States or Japan already use more oxygen than their green plants put back, he says.

This doesn't matter much today. Air circulation brings in plenty of oxygen from other areas. And 70 per cent of the oxygen comes from tiny marine plants, diatoms, anyway. But looking ahead, Dr. Cole wonders how long we can count on the diatoms. The U.S. Food and Drug Administration estimates that half a million different man-made chemicals now find their way to the sea. To judge from experience in estuaries, many of these can poison diatoms or tiny marine organisms that make phosphates, nitrates, and other nutrients for the plants. The late Lloyd Berkner, one of this century's outstanding geophysicists, was studying this when he died a few years ago. He had already estimated that a few pollution diasters, such as leakage of two to three tanker loads of pesticide at sea, could bring on a crash in diatom population. This, in turn, could drop the oxygen supply to a crisis level within a year.

That's one of those extreme calculations scientists sometimes make to drive home a point. Citing it during a press conference at last December's annual meeting of the American Association for the Advancement of Science, Dr. Cole

said: "I think probably we are keeping up with oxygen needs at the present time. But we can't go on taking a million acres a year out of photosynthetic production and poisoning marine diatoms. Thank heaven they haven't paved or flooded the Amazon basin. That tropical rain forest still is producing oxygen for us."

Dr. Cole only brought up the oxygen question to dramatize a presently critical aspect of the population problem, namely, our need to pin down the capacity of our planet to sustain us comfortably. Overpopulation means more than empty stomachs or crowded cities. It means environmental pollution and changed ecologies. As Dr. Cole puts it, "Surely man's influence on earth is now so predominant that he must stop trusting to luck that he will not upset any of the indispensable biochemical cycles." Yet saying this sort of thing doesn't even begin to define the problem. We need to know more exactly what the critical tolerances are so that we can set standards of environmental quality at which technology and social policy can aim.

The Automobile and Air Pollution

Take air pollution in the United States for example. Everyone admits this is a serious problem, especially in large cities. Many experts also agree that most of the pollution comes from automobiles, perhaps 60 per cent. But progress in cutting automobile pollution is coming because someone is expressing the problem in numbers. They are determining what pollution means in specific areas. They are setting up clean air standards and exhaust standards that give both engineers and politicians concrete goals which they can strive to meet.

In doing this for cars, California has led the way. As Dayton H. Clewell, '33, Senior Vice President for Research and Engineering of the Mobil Oil Corporation, points out in his article on page 17, 1968 cars are meeting Federal standards that were set following California's lead. A few statistics show what has been accomplished. Hydrocarbon emissions are cut to 275 parts per million (ppm) or about a fifth of what they were a decade

ago according to a Los Angeles survey. Carbon monoxide in exhaust is down to 1.5 per cent or less than half of what it was in 1956.

Looking ahead, California has set even tougher standards for cars sold within its borders by 1970. These standards drop hydrocarbon emissions to 180 ppm and carbon monoxide to 1.0 per cent. They leave nitrogen oxides at today's standard of 350 ppm. Actually, the transport industry expects to do better than that. Dr. Clewell told the A.A.A.S. annual meeting that the Inter-Industry Emission Control Program (I.E.C.P.) is shooting for the following goals:

"First: to reduce hydrocarbon emissions to 65 ppm—which is more than 100 per cent better than the standards California has set for 1970; second: to reduce carbon monoxide emissions to 0.5 per cent—which is also 100 per cent better; and third: to reduce nitrogen oxide emissions to 175 ppm—which, again is about 100 per cent better than the 1970 standards."

The I.E.C.P., inaugurated last May by Mobil and Ford Motor Company, aims to spend \$7 million over the next three years to "develop the technology for a reasonably priced gasoline-powered car that will emit virtually no harmful emissions into the atmosphere." Five other oil companies have joined the project—Standard Oil Company (Indiana), Atlantic-Richfield, Marathon, Sun, and Standard of Ohio.

Admitting that industry has dragged its feet in co-operating with California and the Federal Government in tackling auto pollution; admitting that projects such as I.E.C.P., in spite of its tough-minded laboratory goals, will not alone solve this pollution problem; admitting that the issue is a political, social, and economic tangle; admitting all this, industry is still making significant progress in cleaning up car exhaust. This makes an important point. Give an engineer numbers instead of vagueness (tell him: "cut hydrocarbons to 180 ppm" rather than "do something about smog") and he's apt to hit or even exceed the target.

Smog Checkpoints

New York also finds this in tackling its smog. From data gathered within the city, its Department of Air Pollution Control (D.A.P.C.) estimates, for example, that 46 per cent of its sulfur dioxide comes from power plants, 46 per cent from domestic heating, and the balance from industry. This both identifies the major offenders and suggests approaches to cutting the SO₂ pollution.

Consolidated Edison's power plants were hit first. According to D.A.P.C. Commissioner Austin N. Heller, "We were able to work out [admittedly after much turmoil] with Con Edison the use of 1 per cent sulfur fuel oil in the fall of 1967, almost four years ahead of the schedule set by local law. As Con Edison's conversion is completed this spring, this step is expected to reduce these emissions by about 25 per cent. We can expect these emissions to decrease further, since by 1976 Con Edison expects only 28 per cent of its power generation to be from coal- and oil-fired stations within the city."

Now New York wants to get at the hundreds of thousands of home and commercial building heating plants. Low sulfur fuels or combinations of gas and No. 2 oil can cut the SO₂ and grit from these heating units by 98 per cent. The problem now is to conceive and carry out a workable plan for converting to these heating techniques. The basic job of pinning down the pollution, setting clean air standards, and monitoring them seems well in hand. Now the D.A.P.C. wants to look at other pollutants such as the toxic metals—vanadium, chromium, cadmium, and lead.

Early this year, New York will have some 38 smog checkpoints across the city. Commenting on this, Commissioner Heller says, "While this information has immediate application in enforcement operations and in times of air pollution incidents, its greatest value will be as a research and planning instrument. The use of this information will permit abatement decisions to be made on a more rational basis." He adds, "... we need to define the problem, validate our data and base our decisions for control on the information we have gathered

and tested. . . . the use of scientific methods can break through problems which seem insolvable at first because of hundreds of thousands of sources of emission and complex chemical reactions which take place in the atmosphere."

Optimum for Population

This is exactly the point Dr. Cole is trying to make with his rather alarming story about oxygen. We are pushing our environment in a variety of ways, many of them quite subtle. In each of these areas we need to do what we are beginning to do for air pollution in America. We need to define what the critical numbers are that we can exceed only at our long-term peril. How much of which chemicals can we dump into the sea? How many people can we comfortably, healthfully crowd into cities? How much of our land can we wisely devote to man-made works, including food production and how much should we save for our refreshment? Scarcely any meaningful research is underway today to answer such questions or to look at our environment as a total system. Yet the most critical number of all can only come from such studies—the optimum human population for this planet.

After fighting New York traffic and lining up for a meal in a convention-packed hotel, Dr. Cole told science writers at the A.A.A.S. meeting, "I personally doubt that the world can support a population as large as it has today on a sustained basis. We may even have to reduce it." This, of course, is another of those extreme, attention-getting statements. Dr. Cole acknowledges he can't be at all certain of this. Nor does he have any easy suggestions for cutting off population growth if we are exceeding the optimum. But we do need to know what that optimum is in the hard terms of reliable knowledge of what our planet can comfortably support. Defining this would be the first step to wide-ranging development of the social and technical means to manage our environment—to ensure our long-term well-being.

Dr. Cole is right when he says the important thing now is for social and

natural scientists to work together to find that optimum population. Then men can work to achieve it "before some miscalculation, or noncalculation, sends the earth environment into an irreversible decline."

Robert C. Cowen, '49, is Science Editor of *The Christian Science Monitor* and President of the National Association of Science Writers.

Scientists in Politics

Hardly anyone remembers the time when to speak of scientists and politicians together in the same sentence, let alone the same room, was to affront the former and amuse the latter. In one generation, the relationship has become so close and complex that the dominant mood is confusion, rather than amusement. The politics of science is not the public politics of baby kissing, campaign oratory, or legislative debate, but operates in the realm of private conferences, formal and informal committees, *ad hoc* advisory groups, as well as occasional Congressional hearings, all of which are reported in the press incompletely, if at all, and often inaccurately. For this reason, whoever wishes to understand the new role of science needs knowledgeable, reliable guidance.

Writing in *Science*, Daniel S. Greenberg has provided such guidance in "News and Comment," surely the best read section of the journal. His lively, informative reports are now available closer to home. It is a double pleasure to welcome his contributions to *Technology Review* and to recommend his new book, *The Politics of Pure Science* (New York: New American Library, \$7.95).

Mr. Greenberg's book has the immediacy of journalism. He has chosen, not the long-range, large field-of-view of history, sociology, or political science, but the sharply focused "intent . . . to look into the politics of pure science to determine what it is and how it works." Since it is likely that no one knows more than Mr. Greenberg about the recent political life of scientists, this approach makes the book indispensable for understanding the interaction between science and government, especially during the past 10 years.

The traditional isolation of scientists ended with World War II, when they were called upon to supply new instruments of war to help preserve the society from whose preoccupations they were ordinarily remote. Under the forceful direction of Vannevar Bush, Eng.D.'16, and with the leadership of a small number of scientist-administrators, many of whom are still prominently active, scien-

tists were drawn in large numbers into the M.I.T. Radiation Laboratory and the Metallurgical Laboratory at Chicago and into the wilds of Los Alamos, Oak Ridge, and Hanford. In a hitherto unimaginable atmosphere in which money was no object, radar and the atomic bomb were produced, hastening the end of the war. But national needs requiring their talents did not end with the war. During the next dozen years, scientists worked on government-sponsored research on new atomic weapons, on air defense and ballistic missile defense systems, and beginning in 1957, on the space program.

The engagement of science with government via applications and technology is not Mr. Greenberg's primary interest. He tells the story from another point of view. The same people who led scientists, through their technology, into practical government affairs also developed pragmatically, almost day by day, a framework within which pure science, basic or fundamental research, is supported by government funds, so that pure scientists are involved in politics, an activity impure by definition.

The system so developed establishes an astonishing relation between the government and a group of its citizens defined solely and completely by the profession they practice. It rests on the principle that although government may provide the funds for pure science, only scientists, not administrative officials of the government, can manage science. The scientist-managers are in agencies such as the National Science Foundation, the Office of Science and Technology and the President's Science Advisory Committee, and the National Academy of Sciences. The administrative process employs two major techniques: the peer system, whereby committees of scientists advise the scientist-managers on the selection of desirable research projects and the allocation of funds; and the project system, which grants money not to universities (where most pure science is done), but to individual scientists for specific research proposals.

Government support with such freedom from fiscal supervision as is granted to no other recipients of public moneys

was achieved only through prior universal acceptance, notably by scientists themselves, of the propositions that the pursuit of pure science is an absolute social good, and that scientists and science are essentially different from other people and activities. This mixed motif runs through the book.

"Laymen, upon first acquaintance with the scientific community's ways of doing business, often are appalled and outraged. That scientists should be both recipient and principal adviser to their public patron runs counter to popular notions of man's capacity for integrity in the face of temptation. But . . . science is unlike any other activity, and the scientific community is unlike any other organization. . . .

"Basic research . . . is recognized as one of the characteristic expressions of the highest aspirations of modern man. . . . In a certain sense it not only serves the purposes of our society but *is* one of the purposes of our society. . . . The traditional scientific view (was) that the internal value system of science guaranteed an ethical standard that required no outside surveillance or reinforcement."

Mr. Greenberg is too good a reporter to accept scientists' self-portraits at face value. His detailed case histories suggest that some aspects of the Mohole fiasco and the episode of the M.U.R.A. proposed particle accelerator border on the intellectually, if not legally, dishonest. He describes questionable practices, such as "waving the red flag" to get funds, compiling "self-serving" statistics, and "conference-riding"—especially to European meetings. He provides damaging quotations and juxtapositions. "The M.U.R.A. people were all our friends. No one likes to deliver a stroke of death, so we didn't kill it off." . . . "It didn't hurt him to be on the President's Science Advisory Committee."

And yet it seems to me that basically Mr. Greenberg accepts the context in which the pure science segment of the scientific community sees itself and its relation to government. Almost as often as he cites such words and deeds as above, he adds qualifications that tend to

dilute the unfavorable connotations of the acts themselves.

"The practice can be explained, if not justified, on the grounds that . . . a Red scare was the only available device with which science could get the government's attention. . . . Nevertheless, though science's peculiar linkage to government did more than a little violence to democratic processes, it passed one important test: It worked well, as measured in what was good for science."

He permits the criterion of workability to override the inherently discriminatory characteristics of the peer system and the deleterious effects of the project system on research and teaching in universities. Furthermore, he asserts that, "Grantsmanship, to my mind, is ethically neutral. . . . The issue is not the ability to get money; rather it is the use to which the money is put." Is this to say that, in the cause of science, the ends justify the means?

I hope it is clear that despite, perhaps because of, the questions it raises, this is a significant book that should be widely read. It suggests that scientists, in entering into politics for the sake of science, surrendered not only their innocence, but the objectivity that entitled them to claim unique status. For whoever steps into the political arena must expect to be judged, like other gladiators, not by intentions but by acts.

In Brief

The Lost Heritage of Alaska (Cleveland: World, \$15) is a handsome book about the Tlingit and Haida Indians of Alaska. Beginning with Bering's discovery of Alaska in 1741, the authors, Polly and Leon Gordon Miller, relate the history of the Coastal Indians, as told in the logs and journals of the explorers who made contact with them, and describe the arts of these now declining cultures. The narrative is enhanced by many excellent drawings and photographs, which would have served their purpose even better if they bore captions.

Eight Lines and Under (New York: Macmillan, \$3.95), edited by William Cole, is an anthology of short poems by famous

poets (Blake, Burns, Yeats, Pound, Frost, among many others) and obscure ones, from the Seventeenth Century on.

The book is small enough to carry in a coat pocket, to be available for instant browsing. My current favorite is "Like They Say" by Robert Creeley, a contemporary poet.

"Underneath the tree on some soft grass I sat, I watched two happy woodpeckers be disturbed by my presence. And why not, I thought to myself, why not."

George Gamow's stories about C. G. H. Tompkins, whose initials have a fundamental physical origin, were first published by C. P. Snow in the British magazine, *Discovery*. Subsequently collected in *Mr. Tompkins in Wonderland* (1940) and *Mr. Tompkins Explores the Atom* (1944), they introduced a generation of readers to relativity and quantum theory in popular, entertaining, but never condescending, style. For a recent single paperback volume combining the two earlier books, Professor Gamow updated the old stories and added some new ones on recent advances in physics. The same publisher has issued a hardcover edition with the logical, but inappropriate, title *Mr. Tompkins in Paperback* (New York: Cambridge University Press, \$4.50). Now it is possible for fans of Mr. Tompkins to follow his new adventures among the pions and in the steady state universe.

New from the M.I.T. Community

The Coming Revolution in Medicine, Dr. David D. Rutstein. Cambridge and London: The M.I.T. Press \$4.95. New developments in medical science and in many other fields portend changes in the practice of medicine and in the training of doctors, nurses, and professional technicians; this book is developed from a series of lectures delivered at M.I.T. during 1966-67.

The Rise and Fall of Project Camelot, Irving Louis Horowitz, Editor. Cambridge and London: The M.I.T. Press, \$2.95.

An analysis of the events and their significance surrounding the conception and cancellation of Project Camelot, a plan for a general social systems model for studies of social change in developing nations. Includes a chapter on "The Necessity for Social Scientists Doing Research for Governments" by Ithiel D. Pool, Professor of Political Science, M.I.T.

The Complete Medical Guide (third edition), Dr. Benjamin F. Miller, '28. New York: Simon and Schuster, \$9.95. A new edition of a long-time favorite—a family guide to medical knowledge in terms useful to those confronted with simple health and medical planning questions.

Encyclopedia of Chemical Technology, Vol. 12, Anthony Standen, S.M., '29, Executive Editor. New York: Interscience Publishers (John Wiley & Sons, Inc.), \$40. A new edition of this standard work, including several new entries and many revisions.

Collective Oscillations in a Plasma, A.I. Akhiezer, I.A. Akhiezer, R. V. Polovin, A. G. Sitenko, and K. N. Stepanov. Cambridge: M.I.T. Press, \$8.50. Papers by Soviet workers on the theory of linear oscillations in a "collisionless" plasma, where binary collisions can be disregarded.

A Manager's Guide to Marketing Research, Paul E. Green, Jr., Sc.D. '53, and Ronald E. Frank. New York: John Wiley and Sons, Inc., \$7.95. Recent methodological developments in marketing research and future potential work on technique development in this field, designed to acquaint business executives with new technology now available for solving marketing problems.

Joseph Mindel is a member of the M.I.T. Lincoln Laboratory. He was formerly a teacher, department head, and administrator of science education in the New York City secondary schools. He has written on science education and the history of science and is the author of many radio and television plays. The notes "New from the M.I.T. Community" have been prepared by the editors of *Technology Review*.

This is the image of a Kodak mechanical engineer



Correct, literally. But misleading because Larry Wood's job is not typical of Kodak engineers in general. Most of them get to handle a camera—assembled or disassembled—only at home or on vacation. Unless they happen to be personally hipped on cameras (which Larry once told us he is).

Diversification has been going on here for a long, long time. That's why we can give an engineer plenty of solid ground for choice—at the outset and later. If his personal feelings incline him away from devoting his talents to fun things like cameras, he gets just as good a chance to demonstrate his capacity for higher responsibility through work in the 72% of our business that has nothing to do with fun cameras. He may be solving problems in the packaging of bulk vitamins for dairy cattle or designing spinnerets for polyolefin hay baler twine or making x-ray processing machines run faster so that society can get more use out of its short supply of doctors.

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edited by Sanborn C. Brown

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Selected Scientific Correspondence,
with Commentary
edited by Robert E. Schofield

Joseph Priestley's science was an activity of his leisure, for he was by profession and conviction a minister who prized his scientific reputation, because, as he wrote in his *Memoirs*, it gave weight to his "attempts to defend Christianity." His own account of his life, therefore, neglects just those aspects for which he is primarily remembered and on which we would most like to have his views. This work provides that account of Priestley's scientific pursuits, in his own words, through selections from his correspondence, related memoranda, extracts from his *Memoirs*, prefaces, etc., with a commentary that relates these writings to Priestley's life and to his scientific work as a whole. \$15.00

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Reflections on a Life in Medicine and Science
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foreword by Hugh Trevor-Roper

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Capital Stock (6,000,000 shares authorized and outstanding, par value \$12.50)	75,000,000
Surplus	155,000,000
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TOTAL LIABILITIES AND CAPITAL ACCOUNTS	<u>\$3,391,239,900</u>

184th Annual Report from The First Team

The First National Bank of Boston / Condensed Statement of Condition
Covering all Offices and Overseas Branches as of December 31, 1967

The figures of Old Colony Trust Company, which is beneficially owned by the shareholders of The First National Bank of Boston, are not included in the above statement. The First National Bank of Boston is a member of the Federal Deposit Insurance Corporation.



Compute position, ground speed, distance to go, cross track error to accuracies in tens of feet; operate ECM and fire control...all at up to 100,000 feet and Mach 3, from -60 to 125° C, in intense RFI. Do it reliably. And economically. In a minimum of volume, with a minimum of weight. That's just part of what you'll do here.

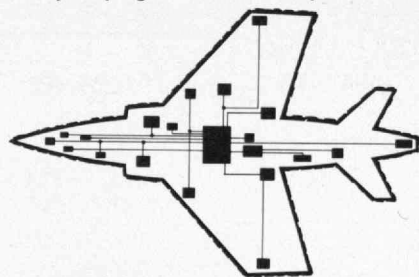


Designing special-purpose digital navigational computers for the airborne (and spaceborne) environment isn't easy. But when you compound the difficulty by demanding logic and memory powerful enough to interface with and control virtually all a vehicle's critical systems, coupled with more stringent reliability requirements and a more hostile environment, you really take the measure of a computer specialist.

That's exactly what we're doing in the new Computer Group at ITT Avionics. Formulating an all-out proprietary design/development effort to refine our already significant navigation computer capability.

To begin with, we're talking systems:

Because the computers we're designing must interface with next-generation aircraft, you know we're thinking about the macro-picture (even though we'll talk microcircuits). With modern recon/weapons-delivery systems relying increasingly upon EDP techniques, the navigation-only computer is on its way out. And we're busily helping formulate its replacement.



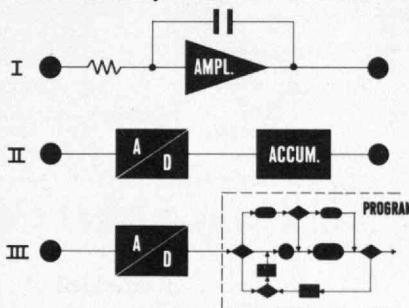
What does this mean to you? To begin with, an overview: a voice in setting systems objectives and trade-offs. And equally important, a chance to broaden your horizons. Into memory, if you're a logic expert...or vice versa. Into peripheral equipment for interfacing with the vehicle: A/D, D/A, servos and the like. Or into display systems and human engineering, if you've a mind.

We're talking concepts too:

When we talk about formulating systems

ideas, we're not talking 'formula' designs.

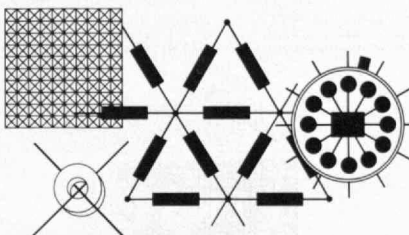
An example? Let's talk about the integration function, as applied to filtering a noisy signal in a LORAN receiver. Of course, the state of the art is beyond an analog integrator: we put the receiver output through an A/D converter and into an accumulator. Make the A/D interface sophisticated enough and you have effective filtering. But not effective enough, when you consider the real-time constraints of today's Mach 2+ aircraft.



One of the approaches we're considering is combining receiver and computer. As soon as the signal is strong enough, we make a direct A/D conversion, and use the digital output as an operand in a program. Result? Theoretically, real-time adaptive filtering.

We're also talking hardware:

We're looking for hardware people with a conceptual bent. The reason? A belief that innovations proliferate only when lines between theory and practice are flexible or nonexistent. The kind of people we want see hardware from a systems viewpoint. Memory people with enough



savvy to talk about more than an improved NDRO memory—suggesting modification in systemwide word length if necessary. Logic people who can look beyond a 1 usec target unit add—insightful enough to show how T²L will yield faster process time, or CTL more powerful logic if system design is restructured accordingly.

Most important, we're talking futures:

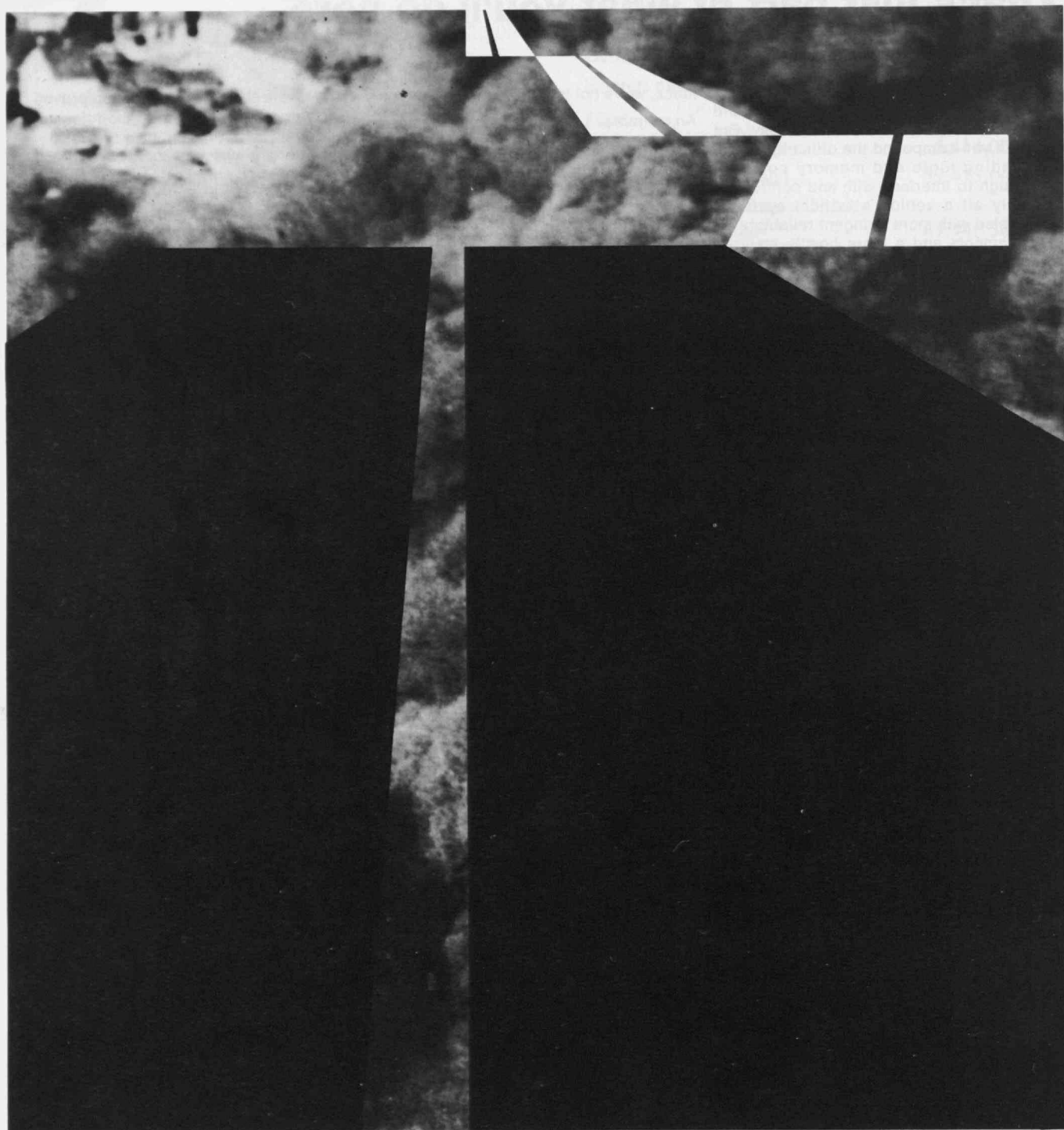
You're probably familiar with ITT's two-decade-plus history of accomplishment in the field of precision navigation, with basic and improved versions of LORAN, TACAN and OMEGA to our credit. But future implications derive from more than history. They're based on a firm management commitment to leadership in this field—a commitment with strong implications in the special-purpose computer area. But beyond this, there are the intrinsic implications of the computers themselves...where basic systems hardware techniques are readily transferable from aerospace to shipboard and land environments: areas where the Avionics Computer Group can provide substantial support for other ITT Divisions. What better implications are there for personal growth?

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- Sonar Recording Systems
- ASW Tactical Team Trainers
- Acoustic Countermeasures
- Direction Finding Equipment
- Reconnaissance and Surveillance
- Advanced Electromagnetic Warfare
- Aerospace Ground Equipment
- Digital Systems and Displays
- Special Purpose Computers

Please forward your resume to Mr. Robert T. Lehman, ITT Avionics Division, Room 400-K, 390 Washington Avenue, Nutley, New Jersey 07110. All inquiries will be answered promptly.

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Can pollutants from gasoline-powered vehicles be reduced sufficiently to forestall the demand for electric cars?

By Dayton H. Clewell, '33

The Search for the Clean Car

It was a sparkling day. In the clean, brisk Denver air, the politician from the East waited for the introductory applause to subside. Then, looking up at the clear skies, he said with a grin and in a mock tone: "I've come here to warn you about the way you're polluting the air with your cars."

In 1968, many speakers are delivering similar warnings. Sometimes, as in this example, the warnings come in a spirit of levity; normally, however, the tone is serious.

In the Administration, John W. Gardner, Secretary of Health, Education and Welfare, has been credited with saying that the internal-combustion engine is on some kind of collision course with the interests of the American people. In Los Angeles, where pollution has continually exceeded objectionable levels, some city and state officials have called for a ban on all gasoline-powered vehicles by 1980 and quick introduction of an electric car—which many already regard as the inevitable replacement of today's gasoline-fueled car.

Fortunately, programs are under way that many of us believe will solve the problem without such drastic changes.

Systems Approach to Reduce Pollution

Automotive pollution is, of course, one aspect of a more general problem facing our highly industrial society. Pollution of the air, water and land, especially in and around our cities, results directly from the very high standard of living our society enjoys today. This high standard is made possible in large part by the betterment that people achieve through working co-operatively in large urban centers. Additionally, the per capita use of energy and materials is growing at a high rate. As a result, the air, water and land are being called upon to absorb rapidly increasing wastes created by human activity. Until the problem is fully recognized and attacked, these wastes remain to impair our economy and make life unpleasant. The problem will undoubtedly be solved, just as other

problems created by an evolving society have been solved, when clearly recognized.

Just last February, President Johnson declared in a message to Congress that everyone had "the right to clean air—and the duty not to foul it." This amounts to a policy to which oil, auto and other companies with a stake in the auto can readily subscribe.

Mobil Oil Corporation, my home base, requires that its divisions operate "with full concern for the protection of public health and property from harmful pollution of air and water." But Mobil and several other companies have gone considerably beyond the mere enunciation of a creed by implementing "study and action" programs in the field of pollution control and abatement.

These have recently given rise to a program formulated by Mobil and the Ford Motor Company, known as the Inter-Industry Emission Control Program. Under its terms the two companies, joined since by others who will share the cost, have agreed to spend \$7 million in three years to develop a fuel-engine system that will virtually eliminate pollution caused by automobiles.

The agreement is notable for its adoption of the systems approach to solve the problem of automotive emissions. Thus, the solution to each part of the emissions problem, whether it be based on fuel chemistry, engine design or vehicle operation, will be examined and considered on the basis of interaction with every other part. And the program has the goal of minimum cost to the motorist to accomplish the necessary control of pollution.

The Inter-Industry Emission Control Program aims to achieve emission standards even lower than those set up by California, a state that has been dealing with automotive pollution for a long time (see *Table on next page*). Many thoughtful people in industry and in government agree that a systems approach is the best way to achieve these low

Goals of the Inter-Industry Emission Control Program conceived by Ford Motor Company and Mobil Oil Corporation are contrasted with figures for automobile emissions in Los Angeles in a 1956 survey, and present-day and proposed future standards for the state of California. The program, in common with others now getting underway, aims to develop necessary technology to reduce the emission of air pollutants from gasoline-powered vehicles to acceptable levels.

	Exhaust Emissions		
	Hydrocarbons ppm	Carbon Monoxide %	Nitrogen Oxides ppm
Level found in 1956 survey of Los Angeles	1375	3.7	1000
Present standards in California	275	1.5	350
1970 standards promulgated for California	180	1.0	350
Technological objectives of Inter-Industry Control Program	65	0.5	175

levels. Just as the United States plans a systems defense, say, as an answer to marauding submarines, by drawing on a whole array of electronics gear, submarines, surface vessels, aircraft and an extraordinary range of weapons, so must industry draw on an array of answers to automotive pollution. Indeed, the H.E.W. Task Force on Environmental Health and Related Problems recommended the systems approach this summer to Secretary Gardner for dealing with all forms of pollution.

No single, sweeping answer, such as the electric car or banning the combustion engine, is likely to provide a practical solution to the series of complex problems stemming from automobile emissions, which include such seemingly unrelated factors as chemistry, cost, taxes, car population densities, highways, aging and inefficient autos, lackadaisical maintenance, weather, and even the growing influence of city planners bent upon breaking up city cores and thus auto densities. Consider the effect, for example, if a ban on today's combustion-powered car and its replacement with an electric car became an immediate reality.

Based on today's technology, an electric car costing about \$500 to \$1,000 more than today's small cars might be capable of top speeds of around 50 mph, and be able to travel 50 to 60 miles at best (although not at 50 mph) before needing its batteries recharged. Much more expensive cars could possibly be built with somewhat better performance.

These facts imply several things. Firstly, they mean high initial costs for the owner of an electric car. Secondly, they suggest a car that is practical for driving only in cities and on short trips. Thus, the electric car owner would still need a high-performance, combustion-powered second car for high-speed, long-range turnpike driving. Further, since we have nearly 80 million cars operating in the U.S. today, theoretically at least 80 million electrics would have to be built to replace them, in addition to the number needed by an expanding population. Clearly, the enormity of just the changeover makes the electric car impractical for the immediate and intermediate future. On the other hand, today's auto can be made virtually free of contaminants in far less time than this changeover would take. Nevertheless, considerable research is under way on the improvement of the storage battery, and it is quite possible that sometime in the future an acceptable electric car may become available; but by that time, I believe competition between the gasoline-powered car and the electric car will be based on qualities of performance rather than on pollution rates.

To be sure, there will be nothing simple about reducing objectionable automotive emissions. Despite the absence of a blueprint or a centralized organization of automotive and petroleum experts, today's automobile represents a well-engineered fuel-engine system. Disturbing one part of the system can easily produce a chain of unsettling reactions. Over the years improvements

made in gasolines and lubricants by the oil industry have been quickly adopted by automobile engine designers to improve engine performance. Likewise, petroleum people under the drive of competition have striven to design better gasolines and lubricants to enable a car driver to get better performance from his vehicle at lower cost. Today's fuels and lubricants are admirably matched to today's cars. This stepwise approach has been successful, efficient, and co-operative, but has gone forward at a pace too slow to prevent the pollution generated by an ever increasing car population from overtaking us. The Inter-Industry Emission Control Program is a means of quickening the pace.

Four Sources of Pollution

Ideally gasoline-powered vehicles should produce *no* harmful emissions. Gasoline is mostly a mixture of hydrocarbons—just hydrogen and carbon. If it consisted *only* of hydrocarbons, which burned completely in the engine with oxygen from the air mixed in by the carburetor, all the gasoline would be transformed into water (steam) and carbon dioxide—both harmless. In fact, most of the gas issuing from the tail pipe *is* composed of steam and carbon dioxide, but since combustion of the fuel in the engine is not quite complete other substances issue forth.

To satisfy the chemical equations for complete combustion, the air/fuel ratio of the mixture drawn into cylinders from the intake manifold should be approximately 15/1 (or more). However, this mixture is not rich enough for smooth operation of the engine under some driving conditions. For example, when an engine is idling, the ratio may fall as low as 11/1 or 12/1 to prevent stalling. Usually an engine runs at a ratio of 13.5/1 to 14/1, although when the car is cruising at a steady turnpike speed the ratio may well reach 15/1. As a result, pollution at such highway speeds is very low, but unfortunately these speeds are only possible out in the country where car density is low. Under city driving conditions pollution increases rapidly both because of the high density of cars and because each car becomes a greater source of pollutants in the environment of stop-and-go driving. The main pollutants from such incomplete combustion are carbon monoxide and unburned or partially burned hydrocarbons.

Above certain concentrations carbon monoxide is harmful to human beings: it prevents the hemoglobin in the blood from properly performing its function of carrying oxygen to the body's cells. A deficiency in oxygen supplied to the brain cells can upset a person's judgment to the point where he may not be able to make decisions quickly enough to avoid accidents. It is important therefore that concentrations of carbon monoxide in the atmo-

Tail pipe emission tests represent one facet of the automobile and oil industries' attempts to solve the problem of air pollution by gasoline-powered vehicles. Engineers at Mobil's Research and Development Laboratory in Paulsboro, N.J., are using non-dispersive infrared analyzer equipment to study hydrocarbons, trapped in monster bags (top). Analysis for exhaust emissions under simulated road conditions forms an important part of Mobil's pollution studies. The simulation is performed on a tape-controlled dynamometer (bottom). Co-operative programs with the aim of reducing the problem of auto pollution are gaining wide acceptance in the two industries.



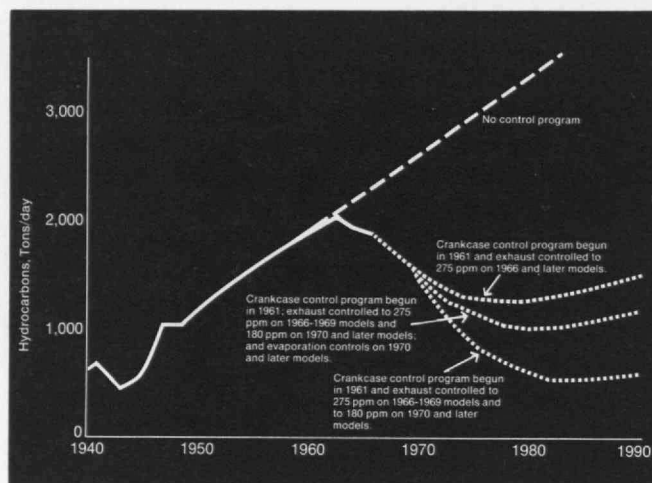
sphere be kept below the threshold level for the impairment of brain functioning. Recent information indicates that an average level of 15 parts per million or less in the atmosphere over extended periods of time is quite tolerable. In all of the United States it is estimated that automobiles discharge about 175,000 tons per day of carbon monoxide into the atmosphere. Though the gas disperses rapidly, it has built up to danger-level concentrations (as high as 150 ppm) at peak traffic hours in some central city intersections.

The next serious problem is the mixture of unburned and partially burned hydrocarbons, which enter the atmosphere at a rate estimated at 60,000 tons or more a day for the United States. The effects of hydrocarbon emissions on humans, animals and vegetation are very complex and sketchily documented, particularly in a quantitative sense. To begin with, the emissions themselves are a complex mixture: some of the components, olefins for example, are quite reactive, while others, such as butane, do not react.

At present hydrocarbons are believed to be the culprits in Los Angeles, since laboratory and field demonstrations have shown that a number of reactive hydrocarbons will react with nitrogen oxides in the presence of sunlight to form eye-smarting substances that can cause considerable discomfort of the type experienced in that city. They appear to contribute to the photochemical smog that forms when, during periods of temperature inversion, hydrocarbons collect in the stagnant air, and are cooked with the nitrogen oxides by sunlight. Los Angeles has been described as unique in its combination of topography, atmospheric conditions and sunlight. Its smog and London smog have very little in common in causes and effects. However, most metropolitan areas now begin to show symptoms of both types of pollution.

A third type of auto emission is a mixture of the nitrogen oxides referred to above. During the combustion process, high peak temperatures are reached, and a little of the nitrogen and oxygen of the air in the combustion chamber tends to combine. These oxides are included in the exhaust emissions. At the moment it appears that their harmfulness is associated with their participation in the formulation of photochemical smog. The nitrogen oxides from autos enter the atmosphere at a rate approaching 10,000 tons a day, but nonautomotive sources also give rise to substantial volumes of these gases.

Particulates are a fourth kind of emission, with a countrywide discharge rate of about 2,500 tons a day. They consist of small amounts of carbon particles and minute concentrations of other



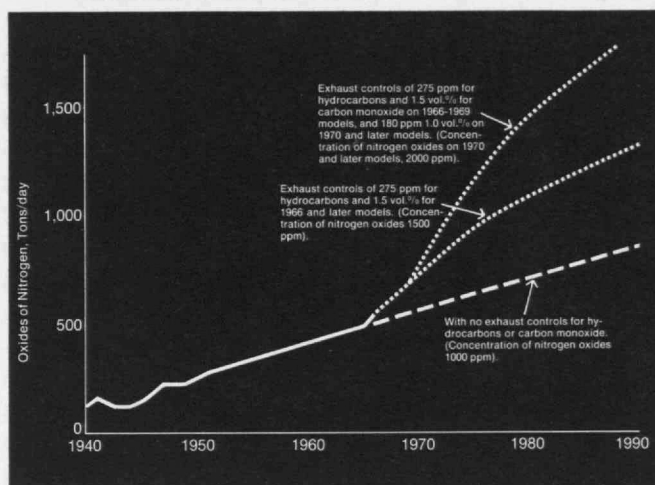
solid particles from the metallic additives that are important to the efficient use of most gasolines. For example, tetraethyl lead is a common antiknock additive that provides a very economical way of securing the octane number required by the efficient high-compression engine used in today's cars. Health authorities have checked the emissions of lead ever since it was introduced into gasoline over 40 years ago. Up to this time no harmful effects have been found, although the reputation of lead remains suspicious.

The emissions emerge from four places in an automobile:

The crankcase. As a source of incompletely burned hydrocarbons that slip by pistons, the crankcase used to account for 20 to 25 per cent of automotive hydrocarbon pollution. Until 1963, automobiles vented this "blowby" into the atmosphere, but since then, recirculating devices that add about \$5 to the cost of a new car have been recycling the hydrocarbons back to the cylinders for burning. In cars with such closed systems, the crankcase is no longer a source of emissions.

Carburetor and fuel tank. Gasoline vapors escape in small amounts through vents from both the carburetor and the fuel tank. They escape from the fuel

Studies of emissions of hydrocarbons, oxides of nitrogen and carbon monoxide from autos in Los Angeles County have given rise to new standards for emissions in the state of California which are evolving into national safety standards. Solid lines show the situation as measured up to 1966; dotted lines the predicted situations under various proposed programs of control. Perhaps the least understood aspect of the problem is how to reduce emissions of oxides of nitrogen; in fact, if emissions of carbon monoxide and hydrocarbons only are controlled, the amount of nitrogen oxides dispersed into the atmosphere actually increases.

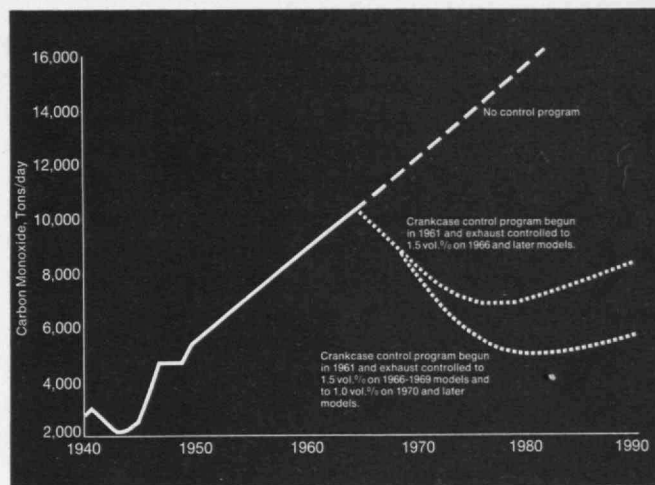


tank at relatively slow rates whether the car is running or not. Evaporative losses from the carburetor vary widely but can be very high when heat from a hot engine that has just been turned off soaks back to the carburetor.

The tail pipe. This, without a doubt, is the most potent source of automotive pollutants: all four types occur in the exhaust. Before crankcase emissions were eliminated, tail-pipe exhaust accounted for more than half of the incompletely burned hydrocarbons and virtually all of the other automotive pollutants. On the smaller base that now exists, it accounts for about 85 per cent of total emissions.

Improving the Standards

Most of the systems to reduce pollution will be guided by California's emission studies—significant works these days for anyone concerned with automotive emissions. Indeed, national standards are already evolving from them (*see charts above*). It was Los Angeles that established a base of unacceptable automotive emissions in 1956 when a study showed that the three major automotive pollutants existed in exhaust in about these quantities: hydrocarbons, 1,375 ppm; nitrogen oxides, 1,000 ppm; carbon monoxide, 3.7 per cent (37,000 ppm).



Since then, the buildup of pollutants has been arrested significantly, and today California has adopted emission standards of 275 ppm for hydrocarbons, 350 ppm for nitrogen oxides, and 1.5 per cent (15,000 ppm) for carbon monoxide. Now, the Federal Government's National Center for Air Pollution Control is applying these same standards nationally to emissions of hydrocarbons and carbon monoxide.

By 1970, California standards—and they may well be national standards by then—will be: hydrocarbons, 180 ppm; nitrogen oxides, 350 ppm; and carbon monoxide, 1 per cent (10,000 ppm). These standards will reduce the emissions from a car to 30 per cent of the carbon monoxide that car emitted in 1940; the level of hydrocarbons will drop to 15 per cent; that of nitrogen oxides to 25 per cent. However, current development goals are aimed at improving considerably on the standards promulgated for California.

One of the complications encountered in removing automotive pollutants is the interdependence of the different types of emission. For example, if emissions of carbon monoxide and hydrocarbons *only* are controlled, in accordance with announced standards for Los Angeles, the emissions of nitrogen oxides will actually increase above existing

levels. At present we know less about how to reduce emissions of nitrogen oxides than we know about reduction of hydrocarbons and carbon monoxide, but the situation makes it evident that we cannot neglect this part of the problem.

The particulate, lead, remains controversial. Minute amounts of lead from many sources find their way into the internal organs of human beings. Some analysts today offer studies showing that lead is accumulating in the environment, the presumption being that lead is also accumulating in humans. The Public Health Service, however, has significant studies showing that the amount of lead in humans is no greater than it used to be.

A recent U.S. Department of Commerce automotive pollution study by the "Morse Committee" (see *Technology Review*, Jan., 1968, p. 57) recommended Federal lead standards which would prevent any further increase in total lead emitted to the atmosphere. Since Public Health Service data indicate that present levels of lead in the air are well below safe limits, gasoline lead reductions are obviously not yet necessary. Industry support has been given to the Public Health Service program for setting air quality standards for lead and for providing continuous comparison with actual air quality, particularly in major metropolitan areas.

In fact, lead is added to gasoline in extremely small quantities. The industry average today is 2.50 cc per gallon. Premium averages about 2.85 cc, regular gasoline about 2.35 cc—less than 0.1 per cent.

Three Alternative Vehicles

The various approaches suggested for reducing pollutants range from replacement of the reciprocating engine altogether to reducing to negligible levels the emissions it produces.

At one extreme comes the electric car. Half a dozen or so programs to develop electric cars are under way and major companies are reviving development of various lead-acid batteries, nickel-cadmium cells, and silver-zinc systems as power sources. Besides these, work continues in developing zinc-air, lithium-nickel halide, sodium-sulfur, and lithium-chlorine batteries. Some of these new systems, particularly the sodium-sulfur and the lithium-chlorine, can potentially increase markedly the watt-hours of energy that can be stored in a given weight of battery. Though high temperatures must be maintained to keep the electrolytes in a molten state and numerous other problems need to be solved, the potential increase in energy density is such that an acceptable battery-powered automobile may become feasible in perhaps 10 years.

Work on fuel cells also looks promising. They have the highest potential mileage range, since they do not depend on electric storage, but can be refueled as a gasoline engine is refueled. However, the fuel cell appears to be limited in its ability to provide bursts of power, and requires a great deal of plumbing as well as expensive and scarce materials, such as platinum electrodes. As a practical source of energy the fuel cell is believed to be 10 to 15 years off; as a standard power source for vehicles it is probably further away than that.

The gas turbine falls between the electric car and the gasoline engine in pollution potential. Since it pulls in much more oxygen than it uses in its combustion process, the turbine burns fuel efficiently and is an extremely meager source of hydrocarbons (well under 180 ppm) and carbon monoxide (well under 1 per cent). But high tooling and manufacturing costs would make it initially a premium-priced car engine. Still, the turbine engine gets high marks, and research continues.

Good as all the electric and turbine developments may be, they will have to compete with the reciprocating piston engine on an economic basis. Moreover, the automobile industry, the oil industry and the industries that service both are devoting very substantial amounts of money and technical manpower to developing a low-emissions auto. Considering the massive effort this suggests, it is hard to believe that the most satisfactory solution for everyone will not come through modification of today's engine and fuels. It will simply be quicker and cheaper.

The co-operative effort of the Inter-Industry Emission Control Program, which I mentioned earlier, is a good example of the extent of the effort. The participants are now Ford Motor Company, Mobil Oil Corporation, Standard Oil Co. (Indiana), Atlantic-Richfield Company, Sun Oil Company, Standard Oil Co. (Ohio), and Marathon Oil Company. Others may join at a later date. Another example is a joint program involving the Standard Oil Co. (New Jersey) and Chrysler Corporation, and yet another co-operative program is now being formulated jointly by the Automobile Manufacturers Association and the American Petroleum Institute.

However, many individual companies, including those engaged in announced co-operative programs, have launched projects of their own to attack automotive pollution. General Motors has a very comprehensive in-house program, and E. I. du Pont and Ethyl Corporation, two major and competing lead suppliers, maintain continuing programs.

Towards the Clean Gasoline Engine

In general, most companies are working with the reciprocating engine in the following ways: As a first approach, research is based on passing engine exhaust over catalysts to reduce hydrocarbons and carbon monoxide in volume by catalytic oxidation. Unfortunately, the catalysts themselves are soon fouled, particularly by leaded gasoline. One task is to build a reliable system that will work under conditions that can vary greatly. For example, if a cylinder begins misfiring, it will dump unusually large loads of unburned hydrocarbons onto the catalyst. This, in turn, tends to raise temperatures to ruinous levels.

A second line of attack involves the nitrogen oxides. As I mentioned before, they form because of high peak temperatures in the combustion chambers of an engine's cylinders. By recycling some of the exhaust gases to the combustion chambers, these peak temperatures can be reduced, and the formation of nitrogen oxides substantially depressed. Catalysts for reducing the oxides to nitrogen and oxygen are also being investigated. Again, long life and low cost are essential.

A third plan makes use of non-catalytic afterburners placed in a car's exhaust system to eliminate carbon monoxide and hydrocarbons. Using this approach, du Pont aims to eliminate emissions without requiring any change at all in existing fuel compositions. The problem here is to maintain sufficiently high temperatures to insure complete burning of the contaminants, but at the same time avoid undue fuel consumption. Here again, protection against extremely high temperatures that can occur under abnormal driving conditions must also be provided. The du Pont device is built around an exhaust manifold reactor that consists of an outer shell, an insulating layer, and a core designed to promote the mixing of auxiliary air with the exhaust gases to promote optimum oxidation.

A fourth activity, which has been under way for a number of years in all of the automobile research laboratories and in the Ethyl Corporation, attempts to improve design of the carburetor, the induction system and combustion chamber. Ethyl's early studies in fundamentals led its researchers to believe that they can modify engines to enable the practical use of lean fuel-air mixtures, and thus minimize the formation of carbon monoxide and unburned hydrocarbons in a car's combustion chamber. Research by many automotive people has emphasized improvement of the fuel-air mixture in carburetors, and distributing it more evenly through manifolds to permit the use of lean mixtures without sacrificing acceptable levels of performance. Considerable reduction in emissions is expected from this approach, but

it is unlikely that it will be able to do the whole job; an afterburner system will be required to complete it.

A fifth area of research deals with new compositions for fuels and lubricants. Fuel additives to improve combustion, carburetion and uniform distribution of fuel to all cylinders are under investigation. Fuel and lubricant additives that will keep an engine clean are under constant development. In fact, a clean engine will take on increasing importance to ensure pollution-free operation over long periods of time.

A sixth area is concerned with the elimination of evaporative emissions from the fuel tank and the carburetor. An approach proposed by Standard Oil Company (New Jersey) uses charcoal to absorb these emissions, or vapors, which are then stripped from the charcoal and fed into the intake manifold of the car during highway cruising. In another approach sealed fuel systems are being considered with fuel injection in place of carburetion.

The results of all this development work will probably be combined in various ways to develop several different fuel/engine systems that will be essentially pollution-free.

The Inter-Industry Emission Control Program will embrace most of these development areas and the program will consider economic trade-offs between various factors. For example, in choosing between systems that will work with lead in the gasolines and those that will work without lead, the initial cost of the system and its reliability will have to be compared with the cost of gasoline with and without lead. The decision will involve billions of dollars for both the oil and auto industries.

There is no question in my mind that, through the joint efforts of industry and governmental regulating authorities, we can continue to enjoy the benefits of the piston-engine driven automobile and restore air quality to where it was in 1940. It will require, however, continuous communication between all the involved parties, both to minimize the possibility of adopting systems that will have to be abandoned later because they are ineffective, and to insure the necessary co-ordination in applying those systems that *do* work.

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Three views of the plaza in Santuario, a small village in the northern Andes and the center of Colombia's traditional ceramics industry. The village was the seat of old and traditional values, and the inhabitants of the plaza perpetuated these ways by making a spectacle of any event out of character. But the advent of electric power upended the rigid social structure of the village.



The coincidence of many factors, both social and technological, sets the scene for social change in a small Andean community

Charles H. Savage, Jr.

Technology's Impact on a Developing Society

A scientist's encounter with a new element, a new process, or a fresh understanding of how a process unfolds can be an exciting business. Usually it happens after years in the laboratory during which the investigator acquaints himself with all that is known about his subject, or all that can be known, until he comes to know its every contour, its every manifestation, the unique patterning which gives it its special form and characteristic. Then one day, unexpectedly, he notes a departure from the customary, a ripple which is not explained by the established pattern, and human knowledge expands just a bit. This is the report of one scientist's encounter with the unexpected in the field of social relations.

My subject has been the underdeveloped world and my laboratory the villages and cities of the northern Andes. Here I have haunted the factories because I have found them to be, above all other institutions, the places where the combustible elements are concentrated and the chances are greatest that the vital new mutant forms will arise. Such an event did, in fact, take place while I was monitoring what had been the routine experience of a workshop in a small village in the Colombian Andes. A unique set of ingredients—technical, social and psychological—combined to produce a mutation in organizational form that was without precedent in the society's tradition. It happened under a microscope that I had set up many years earlier for less ambitious purposes. This is a report of the events before, during and after this critical breakthrough.

An Isolated Community . . .

Human communities are composed of cells which feature systemic interconnection something like that of biological entities; that is to say, the cellular system tends towards internal equilibrium and relation with its environment; and occasionally it evolves. Evolution occurs typically when some latent internal disposition coincides with an external impulse to alter the system significantly. How this happens is central to our schemes of economic

development and nation building; while we have long known that technical input without the social architecture to support it can be a costly and, at times, fruitless business, we have known little about the processes by which technology-supportive social architecture comes into place. It was in a small Andean community that I recorded a series of events that shed new light on this process.

Santuario provides an excellent laboratory for the work of the social scientist. Both geography and its own desires have isolated it from external static and pollution. To reach it one travels up a winding road from Medellin, Colombia's principal industrial city, and over a high valley rim. One next crosses a wide, high mountain plateau to where the road ends at a three-sided mountain wall. Beyond lie mountain fastnesses, tumbling cataracts, a few huts and mule trails and, eventually, the hot valley of the Magdalena River. The road to the village is a bad one and carries little traffic. Securing transport in or out is a difficult business.

Yet reasons for more frequent intercourse between village and city existed. The trip takes only two hours. Santuario has a country charm about it. It is full of pines and flowers and has cool, bright nights. It would make an ideal destination for a Sunday drive or a rustic vacation. The city for its part has all the attractions that might be expected to lure the villager—shops, excitement, a jet airport. That this intercourse has not developed suggests the existence of something more than distance. It suggests social controls that keep the villager in his village and the tourist out.

The Sunday visitor to Santuario finds a reception in its plaza which offsets its physical charm. His desires for compatible food, music and commercial hospitality are not catered to as they are in neighboring villages. Instead he finds himself to be the uncomfortable spectacle of plaza attention, mostly silent, although I have seen two teen-age girls pursued by a howling mob of urchins when they ventured to light up a cigarette.

The plaza in Santuario in fact constitutes an automatic control device designed to screen out contrary values. The tripping device is a rabble of urchins romping in its center and hungry for any bit of drama that presents itself. They coalesce in a minute's time around anything out of character. If the coalescence holds, the interest spreads to strolling villagers or those taking coffee in a nearby tavern. A curious assemblage numbering into the hundreds can take form in a minute's time. I myself have felt the unsettling force of this phenomenon. The simple act of lighting a pipe assures an expectant audience. Two M.I.T. Sloan Fellows who arrived with a Polaroid camera had to be rescued from an intent mob which meant them no harm. Nevertheless, the net effect of this curious social mechanism is to deliver the intruding element in quick order into the hands of authority figures—the *cura* watching from the rectory balcony or the *guardia* in front of the Municipal House—and in this way to maintain the stability of customary ways.

It is interesting to note that Santuario, which features an important cottage industry, has this stabilizing device while its agrarian neighbors do not. The neighboring villages can benefit from commercial hospitality at the expense of traditional ways whereas Santuario, whose industrial vigor depends upon sustaining the old organizational forms, cannot. There is a perceptible difference in the atmosphere of Santuario. The Santuarian knows he is different and prides himself upon it. Thus we have an instance, at this point at least, where industrialization and modernization are running at cross-purposes.

... Living under Destiny

Santuario is the center of Colombia's traditional ceramics industry. For 60 years it has devoted itself to the manufacture of inexpensive chinaware. It has 14 small potteries, powered by waterwheels and employing 20 to 40 workers each. All parts of the machinery—the giant waterwheels, the thumping crushing posts, the mixing barrels, the potting wheels, the kilns—are homemade. "I have never had a mechanic in the factory," one old patron (factory owner) told me. "Necessity is the mother of invention."

The operators work in a circle around the potting table, under the eye of the patron. A sort of pocket-sized "plaza phenomenon" serves to discipline factory behavior. Sons work at their fathers' sides: the patron hires families, not individuals. The tile-roofed structures open on the village. People come and go. The patrons live on the plaza and mingle with the workers to hear their petitions at night. The modest industrial ventures have borrowed from the conventional wisdom

of the village and used it as the steadying device in the difficult transition from field to factory endeavor; and it has worked. Santuario has had the wherewithal to support and sustain its growing population deep into the Twentieth Century to the point where its agrarian neighbors, not so fortified, have fallen prey to the encroachment of outside influence. Santuarians are aware of this fact and cherish the conventional wisdom for the benefits which it has supported.

The central premise of the conventional wisdom is an idea about fixed destiny (their word, not mine!)—every soul has his "destiny." If he observes it, he will receive succor. If he fights it, he will be punished—not deliberately, but in the natural course of things. Many traditional orders feature a somewhat similar concept, but it is the pervasiveness of the principle in Santuario which makes it so striking. It applies to economic class, prestige by generation, occupation, fate in life, even one's temperamental disposition. "My destiny is to be poor," one worker told me, "his to be a patron." All interactions are thus personalized and bereft of individual merit. "If he offers me aid he is merely doing what his destiny as a patron requires that he do." Moreover: "the Lopez' are poor, sick, miserable and hungry; but that is the destiny of a Lopez." One patron told me: "My task of obtaining workers is facilitated by my knowledge of local families. Every family has its (destiny) . . . and these are widely known. For example, I wouldn't have a Gomez in the plant. They are known troublemakers. The Cardonas, on the other hand, are serious and dependable. They make good (supervisors). The Gonzalez are good-natured and hardworking, good people to have around. The Sanchez are heavy drinkers."

How are we to evaluate this interesting operational principle? To some it will seem medieval. Yet Santuario, while a traditional community, is in no sense a primitive one. Employing such a principle, it has created its own industry without outside help or government aid. With the fruit of this industry it has taken care of its own and maintained the integrity of its families and institutions. Santuario has no delinquency, addiction or prostitution. Many Colombians would hold it up as the ideal human condition whose broad-scale replication would be desirable. Yet, on the other side of the coin, the arrangement extorts great personal costs.

Young Marco Antonio is a completely wholesome youth of 15 whose only ambition is to be a potter in the factory of the patron who has employed him for two years. He goes to Mass every morning and the recitation of the rosary every evening,

sometimes returning with holy pictures that he has purchased out of his meager earnings as gifts for his mother or sisters. Everyone loves Marco Antonio, but he is a Sanchez and the destiny of a Sanchez is to be a drunkard. His father's weakness in this regard has reduced the family to complete misery, and the lack of even physical nourishment at home plus the rigid expectations of Marco Antonio's fellow villagers may yet overcome what looks like a promising start towards other things. His employer told me: "Yes, Marco Antonio is doing well but we will have to wait and see. After all, he is a Sanchez."

Little Arcesio is a shoeshine boy at the plaza. He was my first friend in the village and we both look forward to our occasional reunions. He is 17 but has the size and manner of a 12-year-old. He lives in a hovel on the edge of the village full of ragged, sick, even deformed children. Arcesio dearly yearns to work in a pottery where he would do well; but his father also shines shoes and this is to be Arcesio's destiny. Moreover, any patron would think twice before taking on responsibility for this miserable family by hiring one of its number.

But my purpose is not to evaluate Santuario, only to report it, and at the time I set up to monitor its activities for an extended period, it was more than coping with its circumstance. External influence was held in check and internal cohesion had been provided. What held the society together—including the rudimentary manufacturing operations—was a single organizational principle, broadly observed by all parties, which dictated an abiding relationship between superior and subordinate, father and son, priest and patron. And there existed ample power—in the application of which all participated—to deter those who might entertain the ambition to stray from the destiny which life had assigned them.

The Storm Clouds Gather

If there was a cloud in the sky as Santuario moved into the final third of the century, it was that its monolithic and finely honed social form appeared to be incapable of supporting industrial activity which was more complex or on a larger scale. I early noted that none of the factories save one ever exceeded the 50-worker limit. When I asked why, the patrons talked about kiln capacity pointing out that one kiln could support about 20 preparatory and subsequent workers, thus restricting the size of the operation. But this was a fiction! Kilns were constructed by local artisans and their number at a certain site could be expanded indefinitely; yet this never happened. As a plant approached the magic 50-worker ceiling, first one and then a second of the members of the patronal family moved out to set up his own factory.

The fact was that the ceiling on plant size—and the ability to house the more complex technology and specialized skills that go with scale—was contrived more out of social than technical considerations. A patron could be a patron to no more than 50 workers no matter how hard he worked at it. Moreover, the plaza phenomenon produced the necessary operational order for only that size of worker assemblage. It was for these reasons that there were 14 small factories in Santuario rather than several large ones. If the village was vulnerable at this point it was because its social apparatus could not support the scale of technology which was giving other areas a competitive edge in the ceramics market. This was the situation at the time that the regional public utility brought electric power up to the village plaza.

I saw the poles go into place during this period and the cables strung between them. So did the Santuarians. But neither party accorded the event more than casual curiosity. It represented one of those peripheral activities which one viewed as not relevant to his abiding concerns. Only one patron was impressed.

Don José was a product of the village. His grandfather was one of the founders of the industry and José had worked with his father for a while until his skillful application of talent began to push the plant to a larger size. Then, in the natural course of events, he took command of a pottery on his own, farther up the mountain. But José was also one of the younger patrons. He had had a few years of high school in the city and he went there occasionally. He sensed a connection between the new power source and some of the more advanced manufacturing arrangements he had seen on his trips. When electricity came, he sat down and prepared a detailed plan for modest electrification of some of the plants, joint use of capital facilities which were to be acquired, and a sales co-operative to deal with prices and markets.

In keeping with local custom, José approached the village priest who had the bishop appoint a prominent outsider to preside over a meeting of village patrons at which the proposal was considered . . . and rejected. "We're great egotists," reported the priest sadly. "We don't know how to co-operate. Everyone wants to go his own way." The Santuarian patrons had passed up an opportunity to construct a more competitive organizational form, perhaps because of an intuitive estimate of their own historical incapacity to associate to good effect.

José was hurt by the rejection of his plan, but he was not resigned. After the meeting he had

The birthplace and the midwife of the new social order in Santuario. By bringing electric power to his factory, Don José, one of the village's young factory owners, set in motion a series of events which is eroding the traditional values of Santuario, which had previously been protected by the social structure in the factories.



less to do with the other patrons. He reported: "I plan no more approaches to them. I prefer to stay out of their affairs and to deal with them at a distance." He turned inwardly to his own operations as if to demonstrate that his view of the future was the correct one. He brought electricity to his plant. With expanded capacity, he put up a second building. He also put his workers into uniform and built a wall around his plant—the first ever to be built—as if to insulate the changes which it was to house from contrary influences afoot in the village.

At this point, our young patron had created the setting within which the new social form would be born; but he was to be only the midwife, not the parent. Other elements had to come into play before the vital mutation could occur. Yet in accomplishing this preparatory stage the complex of factors which had caused José to create these preconditions should be noted: the first was technical—the arrival of electricity; the second psychological—José's special predisposition arising out of his peculiar biography; and the third social—his rejection by the other patrons. Without all three preconditions, nothing would have happened.

Changing the Old Order

The steps by which the other elements came into play were protracted. The first stage was the upending of the "plaza phenomenon" as the ordering mechanism in José's factory. It happened this way: Electricity made it possible to substitute oil burners for coal in firing the kilns, cutting the firing time in half and thus making it possible for the same ovens to support twice the amount of preparatory and subsequent work. José therefore decided to erect a second building and to spread out his four operating departments (clay preparation, potting, baking and decoration) over twice the area.

The major impact of this change hit the baking and potting departments. The baking department had always been the favored location of the senior men. Loading and firing the kilns was the kind of work where a man could pace himself without being subjected to odious performance comparisons. Moreover, the heat was welcome during the morning chill. The men heated their breakfast chocolate on the hearth. There was always work for a youngster and the kiln-tenders brought their sons to work by their sides, later squatting by the ovens in family groups to take their midmorning refreshment. The oil burners ended all this. A boy was no longer needed to haul coal or ashes. The youngsters were separated from their fathers and sent to the potting room where the work load was expanding.

Forces of tradition grouped behind Don Noah, the most influential potter in Don José's factory. The changes brought about by electric power totally altered the physical layout of the factory, a situation which reduced the influence of senior potters such as Don Noah; and though Noah continued to use his influence to delay the changes, he was finally defeated.

Concurrent shifts occurred in the makeup of the potting department. Each potter had as an assistant a boy who prepared his clay and carted off pieces already shaped. This too had provided an opportunity for father-son collaboration, but the influx of youngsters from the baking room unsettled the arrangement. There was a new spirit in the air, and the old order started to crumble. A few months after electrification, the last father-son potting team broke up. The older men began to feel uneasy and gradually moved over to the more comfortable precincts around the kilns. Thus the two areas, formerly cast in terms of the village operational format, now took on special age characteristics. Moreover, as the production spread out and the area between the two sections filled up with work in process, the visual connection upon which the "plaza phenomenon" depended was lost.

The old order was not yet ready to expire. One older worker remained in the potting room, perhaps because he had too much at stake to take his leave easily. Don Noah was the king of the potters. He had the favored corner position, and made plates, the favored item to manufacture. José considered him to be the most influential of the potters, and he was. His were the last sons to work with their father after the disruptive effects of electrification. He had achieved his position because, above all his companions, his loyalty to the old values was prior; but the new circumstances in the room did not give him the support which his continued pre-eminence required. Many of the older potters had departed and the oven-tenders who were Noah's contemporaries were now out of view, separated both by distance and the new storage arrangements. But Noah was to win one more battle before being upended by the push of events.

Before José's quick succession of moves (the incidents reported above occurred within a single year) Don José had managed his factory with the help of an assistant of his own age and tempera-



ment. But expansion required buttressing of the plant staff. A young villager who had known many cities working as a trucker's assistant throughout the country was hired to drive the truck. A contemporary of his, with several months' training in the city, was employed to guard the gate and keep the books. Finally, the oil burners required a mechanic and, since the village produced no mechanics, a young man had to be brought up from the city. These three young men came together into a new social faction whose council ring was the morning breakfast break. Here they concocted the idea of a plant soccer team.

At this point I should mention that Santuario had no tradition of organized play. It had no playing fields. On free days, sons attended Mass with their fathers, marketed with their fathers, stood with their fathers in the plaza and, on special occasions,



Easter gathering while the storm clouds of technological change were brewing in Santuario shows the author with several villagers in the village plaza.

drank with their fathers. Organized athletics would have been subversive to established custom. The practice sessions would have thrown young men into sustained association with others of their generation at sites beyond the general view, and on Sundays they would have left the village for competition and intensive interaction with young men in other areas not subject to Santuario's particular code.

I had before noted, moreover, the special function which organized athletics plays in the transitional society and, perhaps, in modern society as well. The athletic contest is a sort of folk drama or morality play in which new modes of comportment and interaction are tested prior to incorporation in the general society. Since what is going on during the game is play-acting and not yet reality, the spectators are dispensed from the normal need to sanction and the participants acquire the capacity to improvise in the matter of relating to others and to authorities. Had the proposal of the three young men carried, therefore, the village would have acquired a laboratory where, sheltered from the chilling impact of the "plaza phenomenon," new repertoires of social behavior might have been examined with personal damage to none of the innovators.

Don José might have killed the proposal for a soccer team; he chose not to. It was Noah's influence which brought it down. While Don José was in an experimenting frame of mind, he was still a Santuarian patron, backed by impressive family credentials and not about to take the lead in the subversion of ancient codes to which he still expressed loyalty. But his preoccupation with his new machines and his desire to provide for the survival of the young mechanic whose expertise he required neutralized him on the soccer issue. Don Noah, however, was not so neutralized. The young threesome's proposal required candidates if a team was to be fielded, and most of these candidates would come from the ranks of the young men around the potting table where Noah presided.

The candidates were not forthcoming and the gambit failed, for the time being.

The Moment of Truth

Noah's undoing was caused by a dilemma which Don José unintentionally imposed upon him. With his new machinery in operation, his plant spread out and less chance for visual supervision, José decided to put the men on piece rate. To do this he had to set up a schedule of payments that would be made per hundred pieces according to the piece which a potter manufactured (cups, bowls, plates, etc.), and he chose a unique way to set up such a schedule. Instead of calling the senior potters to his office individually—starting, of course, with Don Noah—he chose to call the entire group in together, men and boys, and—after announcing his intention—requested that they form a *junta* to negotiate the rates with him. In doing so, José dropped a bomb into the social councils of the potting room—which was to end Don Noah's long reign.

The *junta* proposal put Noah in an extremely delicate position. His pre-eminence was based upon massive observance of village protocol; collateral action by the men themselves was not a feature of that protocol. Yet it was Noah's role as king of the potters to take the lead in a situation of this sort, and in the *junta* issue he could not take the lead. The king had to defeat the *junta* issue if he wished to remain king.

Opinion in the potting room split sharply on the issue. Don Noah vigorously opposed it. He visited José in his home and urged him to drop the idea and negotiate the rates individually. He observed: "We are poorly prepared to take our affairs in our own hands." But among the men themselves, Noah's position did not close the issue once and for all as had been the case earlier. Two of Noah's neighbors loosely supported him. Most of the others had no fixed position, but they did not rally behind Noah or permit further consideration of the issue to be closed out as Noah would have



The *junta* which ended Don Noah's reign as king of the potters by negotiating new rates of pay with their patron, Don José. Attilio (top) had argued that a *junta* should be formed, while Don Noah, jealous of his senior position, had opposed it. Attilio could not win the argument alone; it took the impulsive decision of the uncommitted Ramiro (center), backed by another moderate, Hector (bottom), to form the *junta* and set the scene for social change in Santuario.



wished; and one potter at the far end of the table from Noah kept the discussion going.

When I was first introduced to Attilio, the other worker said: "This is Fidel, Fidel Castro." Attilio was a slight, wizened man with intense eyes and a ready smile. No one referred to him as "Don Attilio," using the honorary prefix that most of the senior potters were accorded. He was always moving during the breaks, joking with one group after another, lending money. He was a favorite of the boys and let his assistant try his hand at the potting wheel. They considered him *simpatico* while Don Noah seemed "gruff." He had worked for a while outside the village. After his return he had won a long running battle with the father of a girl in the village who came from a better family, eventually marrying her although the father would still not speak to him. In Attilio's words: "To be a complete man, a worker not only has to know and do his work; he also has to be serviceable to his (work) companions." Attilio strongly believed that José's invitation should be accepted and that a *junta* should be formed. He was the one who carried the argument with Noah which was to result in the vital mutation in group structure.



The Noah-Attilio debate served as a school for the uncommitted. It educated those with no early opinion as to what was involved in the issue under consideration; but once the schooling was accomplished and positions had set, neither man could bring about closure even though the group, faced with mounting uneasiness, desperately wanted it. Noah had been the traditional closure agent, but his basis for closure had been rejected or at least held in abeyance. The fact that he could not perform his traditional function made him uneasy and reduced his serviceability. Attilio desperately wished to provide closure on his terms, but supporting Attilio at this point would have been an affront to Noah which the group was not prepared to mount. Attilio's prominent role in the debate had eliminated his capacity to serve as the moderating influence. Moreover, although the

Family groups in the factory were split as a result of plant electrification, which spread out the factory's operating departments. Members of groups such as these, after working together under the traditional order, moved into different areas of the factory. Pictures show, from top, a father, a baker, and his son, a polisher; a brother, a polisher, and sister, a decorator; and two brothers who are polishers.



younger potters enjoyed Attilio's company and prized his willingness to speak up, they were not always sure where his leadership would take them. They were not sure that he was "completely dependable." It fell the lot of a third potter—one who had remained silent to this point and who had generally been considered an enigmatic figure—to provide the closure which neither Attilio nor Noah could impose.

Nobody seemed to know much about Ramiro. He had arrived during the post-electrification migration from the kiln area. He went out of the room at work breaks to visit with friends in that department. When I asked the boys in the room whom they addressed as "Don," they were certain about Noah and Attilio. They pointed out: "If we didn't address Don Noah as 'Don,' he would wonder why we had stopped doing what we always had done; it wouldn't sound right to say just 'Noah.'" The idea of "Don Attilio" amused them. But in Ramiro's case they were ambiguous, unsure. They concluded that perhaps either manner of address might be acceptable. Ramiro, too, had worked for a year in the city, returning to marry a village girl. He worked in the kiln department where he was always a social participant, but more a listener than a proponent. So low was his social visibility that some of the senior potters did not even recall his being present at the meeting in José's office.

Throughout the Noah-Attilio controversy, Ramiro remained silent. On the tenth day—with anxiety mounting and opinions beginning to take shape—Attilio was regaling a neighbor who worked beyond Ramiro when the following conversation took place:

Attilio: We should send a *junta* to Don José.

Hector: Let's do it.

Ramiro: Let's go!

Whereupon Ramiro shut off his machine, took off his apron, wiped his hands on a rag, and started out of the room. Attilio and Hector quickly followed, leaving Don Noah and the others behind. At this point Noah's reign ended, although it would take all parties some time to realize the fact. About two months later, the mechanic and his associates reactivated the soccer team issue. This time candidates were forthcoming from the ranks of the younger potters. Within a few weeks they went out of the village to play their first game, recruiting a few spares in the plaza to fill out their ranks. Out of these spares, in turn, emerged two more teams. The new social breakthrough had occurred in the factory and spread rapidly to the *sanctum sanctorum* of village values. Irreversible forces tending toward the replacement of the vertical social bias

with a horizontal one had been unleashed. Santuario had gained its scale and technology-supportive social architecture and, with it, survival on its own terms and insurance against external invasion.

Stimuli for Social Change

What is to be learned from this story? Perhaps the most important lesson is that the parents of social change are not one, but many. If the concurrence of events in the potting room of one factory provided the location for the vital breakthrough, the activities of a series of individuals, both inside and outside the room, provided the setting which this breakthrough required and participated directly in its occurrence. The arrival of electricity raised the issue which was to upend the old order, but of itself it was passive and sterile. The cohesive integrity of the village held social circumstances steady for the violent convulsions which had to precede the eventual spin-off of the new organizational form. José's complex personal biography gave him the readiness and the capacity to act, but it was the stand of the older patrons against him that triggered his activity. Even here the gambit might have fallen through had not a somewhat similar process been re-enacted at the worker level. Again, the spatial and generational impetus for a modified social compact arose, this time in the potting room as the result of spatial rearrangement and worker migration. Further, an external agency (the mechanic up from the city) raised the issue, in this case the organization of a soccer team, an activity which would have subverted ancient village ways. But the issue needed response which was eventually forthcoming. Attilio and Noah, committed to offsetting life schemes, provided benchmarks that helped frame the issue for their neighbors and created a tension which moved the group towards its resolution. The *denouement* came rapidly and spread as rapidly back to the plaza which would never again be the same.

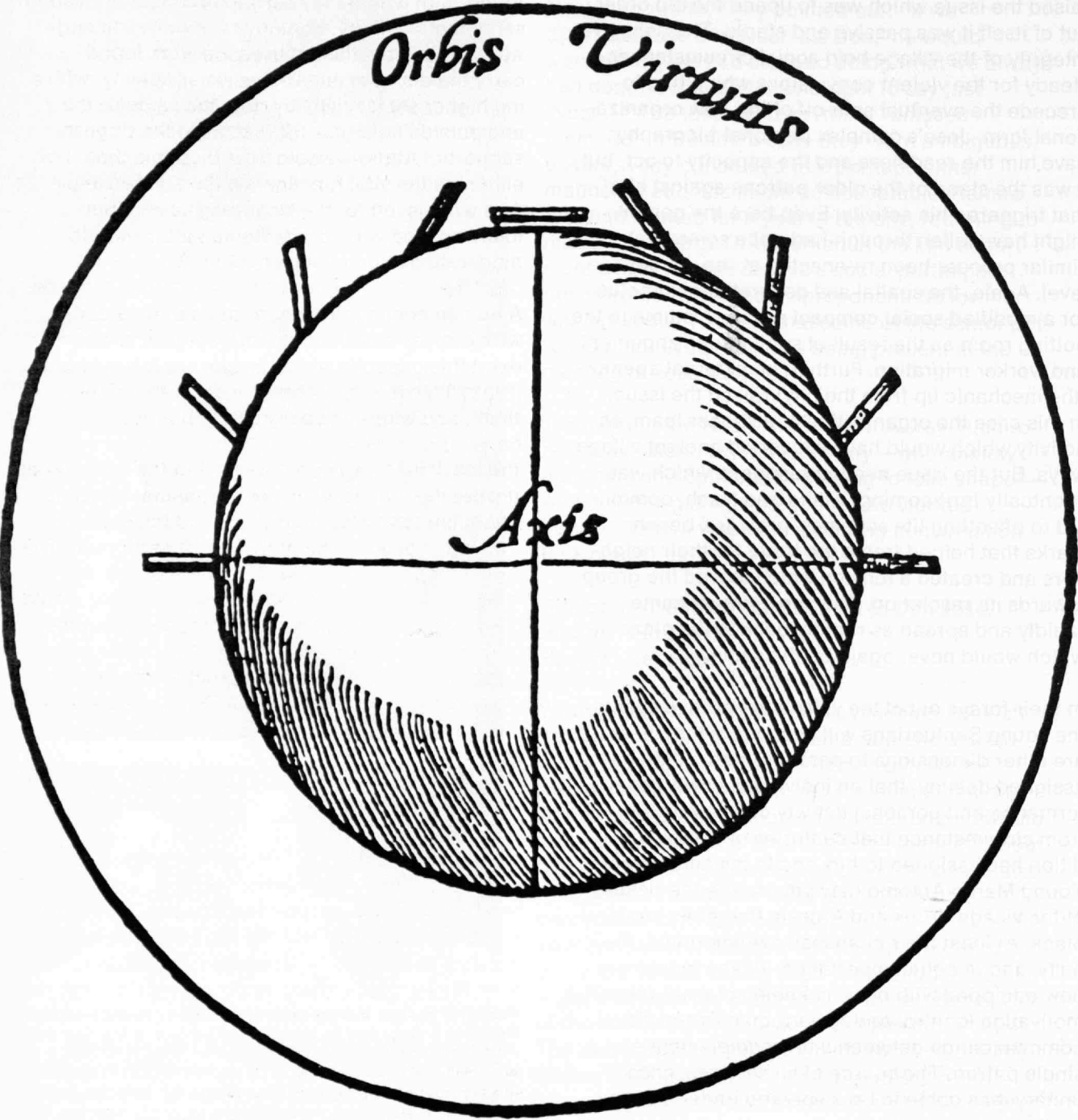
In their forays out of the village to sportive events, the young Santuarrians will soon learn that there are other dimensions to personal status than just assigned destiny, that an individual's own performance and personal activity can rescue him from circumstance that centuries of village tradition had assigned to him and to his antecedents. Young Marco Antonio may yet escape the destiny of the village drunk and Arcesio that of its boot-black. At least their chances have improved. Finally, and of equal importance, village industry is now equipped with other schemes of work-force motivation, control and reward than that of visual communication between a tiny complement and a single patron. The source of all services, once unitary, has come to be dispersed under the new system.

External agents seeking to serve developing societies can well take heed of José's posture at this critical juncture. Some agencies take the simplistic view that all opinion in the target community is equal and undifferentiated. More sophisticated agencies will identify some of the polarization observed in the Santuarrian case. What disposition are they to make of this knowledge? Two courses are popular. The first is to line up with the traditional power center, the Don Noah, in hopes of changing his point of view through salesmanship and persuasion. But what is there to sell Noah? What personal advantage accrues to the man who already enjoys a position he has won as the result of deep convictions skillfully manifested? Others would marry the change force in the picture, the Attilio, with whom they perhaps already share sentimental affinity, hoping that external linkage will help this element to overpower tradition and carry the day. But the Attilios are already suffering higher social visibility than they can bear, and outside linkage—for instance, José's public support of Attilio—would capsize them and eliminate the vital function which it is theirs to play. And what is left for the Noahs if this course is followed, and what of the Ramiros, the vital moderating and healing elements?

A human community has great healing capacity, whatever its condition of development. It will exert this capacity where issues are foisted upon it with full conviction that it is capable of resolving them, and where the external agents, the José's, have their own needs well enough in hand to permit the inevitable processes which seem to be by some unspecified divine plan a feature of the human condition to work through to successful conclusion.

Professor Savage is a member of the faculty at the Harvard Business School and its Educational Adviser to the Central American Institute of Business Administration (I.N.C.A.E.). He has been associated with M.I.T.'s Inter-American Program in Civil Engineering since its founding; I.A.P. and the Sloan School of Management supported the research reported here under Ford Foundation grants.

The earth's magnetic field in the view of William Gilbert, the Seventeenth Century scientist and philosopher. In his treatise *De Magnete* Gilbert discussed the region of space *Orbis Virtutis*, surrounding the earth wherein magnetic effects were observed. Gilbert realized that the earth behaves externally like a magnet by comparing the tilt or dip of a compass needle on the earth with that of a needle close to a spherical lodestone. Today, scientists use sophisticated space-age techniques to investigate the earth's environment and its interaction with the continuous stream of particles from the sun known as the solar wind.



Satellites and space probes are giving earth scientists a comprehensive picture of our planet's environment in space

Norman F. Ness, '55

From "Orbis Virtutis" to Geomagnetosphere

During the past 10 years the remarkable technological development of satellites and space probes has provided man with a new view of his interplanetary environment. We are all familiar with the dramatic response of the world, the nation, the scientific community and the United States Congress to the advent of the space era with the launching of *Sputnik 1* in October, 1957. Since then a large number of instruments of increasing sophistication has been launched to provide *in situ* measurements of our space environment. A new scientific discipline has arisen, referred to as space science, which numbers among its branches the study of the physics of the earth's magnetosphere.

Early Investigations

Early references to this outer region of space can be found in the treatise of William Gilbert, written in the 1600's, which discussed the magnetism of materials and the magnetic field of the earth. These physical phenomena provided a means of navigation for commercial and exploratory endeavors through use of the familiar directional compass. The illustration opposite summarizes Gilbert's picture of the outer region of space surrounding the earth. The Latin phrase *orbis virtutis*, denoting the earth's external magnetic field, represented the space surrounding the giant spherical magnet through which the earth's influence extended.

After Gilbert's time, the subject developed only slowly up to the start of the Twentieth Century. At that time geophysicists and astronomers turned their attention to the effect of solar flares on the earth. These revealed that a worldwide disturbance of the earth's magnetic field frequently occurred a few days after a solar flare. The disturbances followed a characteristic pattern: an initial phase, involving a very small sudden increase (on a time scale of minutes) of the horizontal component of the geomagnetic field, followed by a decrease, the main phase, lasting several days with a larger change in amplitude, and a subsequent recovery phase, during which the field returned to its previous average value.

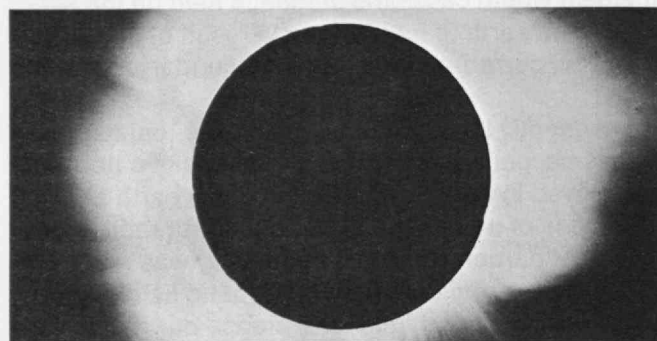
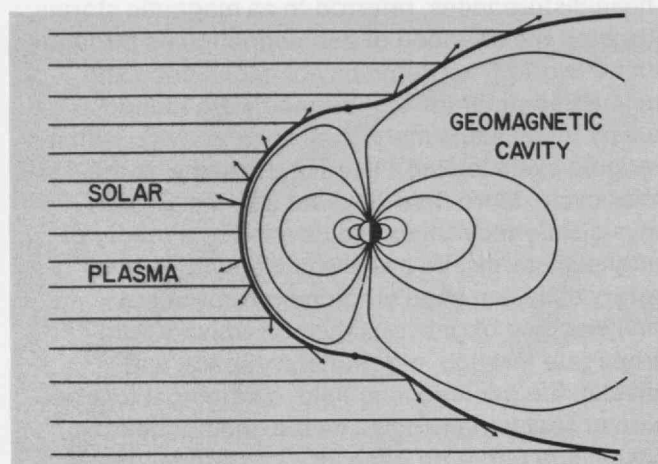
These disturbances, referred to as magnetic storms, attracted the attention of geomagneticians throughout the world. The frequency of occurrence and the magnitude of the disturbance were found to vary in the same manner as solar activity, with a periodic cycle lasting 11 years, the same as the solar cycle. More than 30 years ago the English physicist Sydney Chapman developed a theory of magnetic storms. Its basis was the sudden temporary emission of an electrically neutral but ionized cloud of gas from the sun which would propagate through interplanetary space and envelop the geomagnetic field, confining it to a region of space then known as the geomagnetic cavity (see figure on page 36). The sudden confinement would cause the magnetic field on the surface of the earth to increase, as a result of the electrical currents flowing on the boundary.

Subsequently it was postulated that the ionized gas, or plasma, penetrated into the geomagnetic field and moved in a closed path around the earth at a distance of approximately 6 to 10 earth radii. The motion of particles trapped in this way was referred to as a *ring current*. Its magnetic field would cause the terrestrial field to decrease during the main phase of magnetic storms. The final dissipation of the trapped mass of particles then allowed the geomagnetic field to return to its original undisturbed condition. This theory successfully explained many major qualitative features of magnetic storms and their solar association.

The Solar Wind

Early in the 1950's, the German astrophysicist Ludwig Biermann suggested that the sun continuously emits a plasma. The impetus for this idea was the observation that the ion tails (although not the dust tails) of comets always pointed away from the sun, regardless of the comet's motion relative to the sun. Since spectroscopic studies identified the material present in the tails as heavy ions such as CO^+ , N_2^+ and NO^+ , radiation pressure was clearly insufficient to provide an explanation for the effect. Biermann suggested that only a sub-

Simple view of the interaction between plasma from the sun and the earth's magnetic field, developed in the 1930's to explain magnetic storms. Plasma from the sun was assumed temporarily to envelop the earth's field, confining it to the region known as the geomagnetic cavity (top). Electric currents flowing at the boundary between magnetic field and plasma would increase the magnetic field at the earth's surface. The sun acts as a continuous source of supersonic plasma as a result of the high temperature of its corona (bottom).



stantial continual stream of plasma from the sun could yield the necessary forces to orient the ion tails away from the sun.

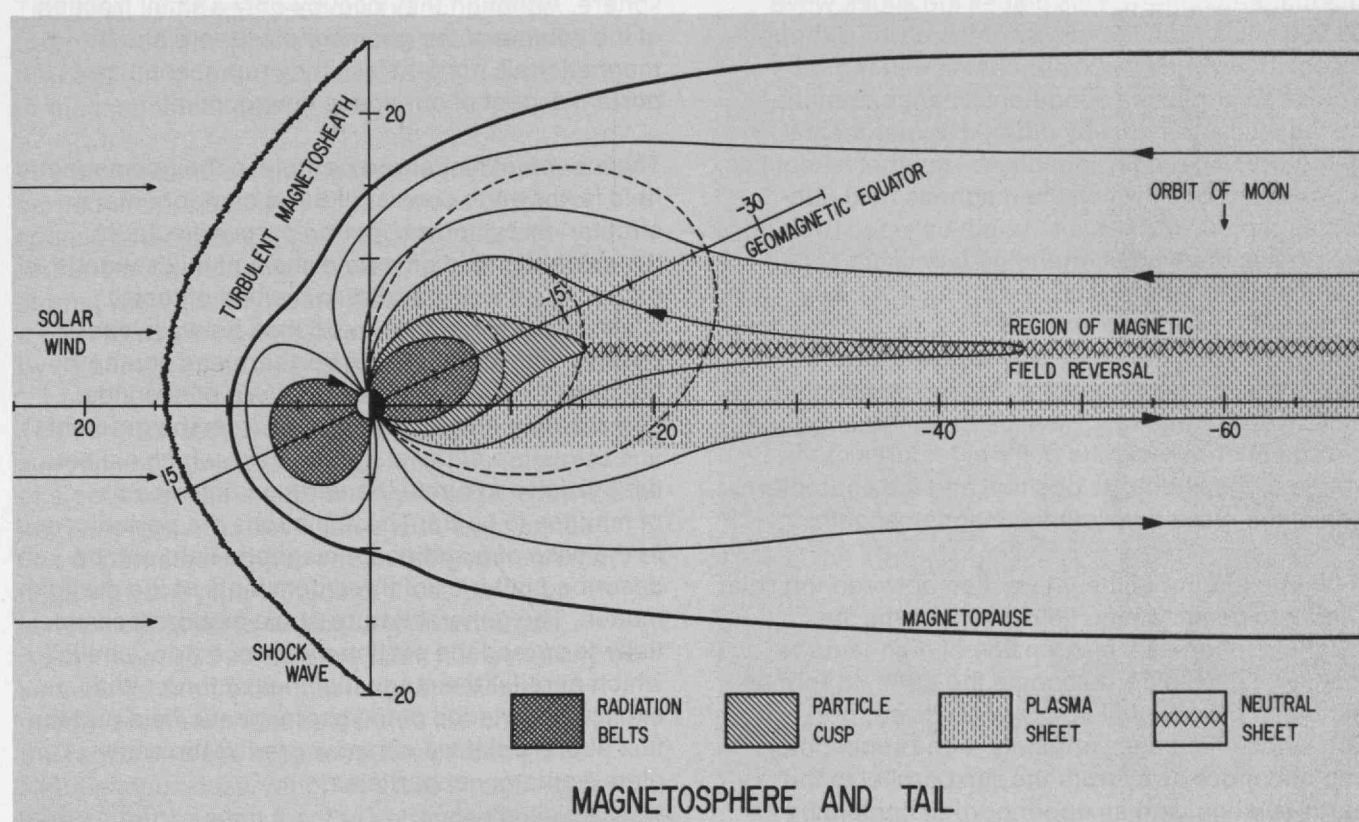
Theoretical studies by the American astrophysicist E. N. Parker beginning in 1957 introduced the possibility that the sun acts as a continuous source of supersonic plasma, owing to the very high temperature of the solar corona. Solar magnetic fields, it was suggested, were insufficiently large to hold the plasma within the solar atmosphere. In fact the solar plasma convects these fields away from the sun and they form the interplanetary field.

Experiments launched aboard satellites and space probes have shown that the continual flux of solar plasma, the solar wind, is a most important feature of our space environment. At one astronomical unit—the distance between the earth and the sun—about 3×10^8 positive ions pass through every square centimeter of space in each second, with an average energy of 1 Kev. The solar wind consists principally of hydrogen, with 5 per cent of helium. Its velocity varies between 300 and 800 km/sec and the wind has an average density of 5 particles per cubic cm. This plasma stream distorts the earth's magnetic field permanently and leads to the formation of an extended magnetic tail in which lines of force originating in the two polar regions of the earth are stretched out away from the sun to distances greater than 500,000 kms.

The solar wind compresses the geomagnetic field to a region of space around the earth which we now refer to as the magnetosphere, a term suggested by Thomas Gold of Cornell to describe that region of space in which the geomagnetic field plays a dominant role in governing the motion of charged particles. On the sunward side of the earth the magnetosphere extends to an average distance of some 10 earth radii—about 42,000 miles. Direct measurements by satellites have shown this boundary to be sharp, defined by an abrupt decrease in the strength of the magnetic field and the fluxes of trapped particles. The boundary is quite thin (several hundred kms) and frequently in motion in response to varying conditions in the solar plasma.

At the point of the geomagnetosphere nearest to the sun, the internal geomagnetic field contributes approximately 300μ Gauss to the observed magnetic field of 600μ Gauss. (A μ Gauss is one millionth of a Gauss; the earth's field at the surface is about half a Gauss.) The secondary magnetic fields associated with the deflected flow of plasma provide the remainder of the field. Early satellite studies prior to 1963 revealed that the magnetosphere's boundary extends from the nearest point to the sun to the dawn side terminator.

Present-day view of the earth's magnetic environment is based largely on evidence from satellites and space probes. The solar wind permanently compresses the geomagnetic field on the day side of the earth and stretches it out into a long magnetic tail on the night side. Recent satellite measurements have shown that the tail stretches beyond the orbit of the moon; in each monthly orbit around the earth, the moon spends four days embedded in the magnetic tail.



The Earth's Shock Wave

Late in 1963 the U.S. satellite *IMP 1*, carrying an M.I.T. plasma probe and other instruments sensitive to magnetic fields and cosmic rays, penetrated beyond the boundary of the magnetosphere (the magnetopause), into interplanetary space. The instruments detected a second boundary and identified it as a detached bow shock wave enveloping the blunt-nosed geomagnetosphere. This plasma shock wave is analogous to the shock wave which forms around high-performance aircraft in the atmosphere and around a missile as it re-enters the earth's high atmosphere. In the case of the earth the solar plasma also forms a "magnetosheath" of fast-moving turbulent plasma and fluctuating magnetic fields between the shock wave and the geomagnetosphere (see illustration above).

The formation of the bow shock wave remains largely a mystery. The solar plasma travels through space at speeds from 300 to 800 km/sec. At this high speed, equivalent to a Mach number of seven, it is well known from studies in classical high-speed aerodynamic flows that a detached bow shock wave occurs, across which physical properties abruptly change. But in spite of considerable experimental study of the earth's bow shock wave there is as yet no adequate quantitative theory for its formation. A major difficulty is the nature of the medium: an anisotropic magnetized collisionless plasma for which certain critical values of physical properties are still not adequately measured.

The detached bow shock wave occurs approximately four earth radii beyond the boundary of

the magnetosphere. This places the shock wave 58,000 miles from the center of the earth, although its position varies by 20 per cent in either direction as solar plasma conditions change. Simultaneous measurements by different experimental detectors can readily identify the magnetosheath as a broad region in which the magnetic field fluctuates rapidly and has a strength between two and four times the typical interplanetary value of 60μ Gauss. The temperature, or random velocity, of the solar plasma is enhanced by an order of magnitude. Theoretical studies of the solar wind flow around the magnetosphere, based upon a fluid dynamic analogy, have been remarkably successful in predicting the general features of the shape of the shock, its position and the characteristics of the plasma flow in the magnetosheath.

A unique feature of the interaction between the solar wind and geomagnetic field which forms the magnetosphere is the extension of high-latitude magnetic lines of force behind the earth, to form a magnetic tail. The tail consists of a lower portion whose field lines originate in the south polar cap and move away from the sun parallel to the earth-sun line, and an upper portion containing field lines oriented in the opposite way, and connected to the north polar cap. The field's strength decreases radially from about 160μ Gauss at 20 earth radii to 8μ Gauss at 60 earth radii. Separating the two opposing fields is a thin region of field reversal containing a very weak magnetic field embedded in a sheet of plasma. The existence of the plasma sheet is necessary to maintain the two regimes of oppositely directed field from collapsing and annihilating each other.

Direct observations of the geomagnetic tail began in 1964 and recent observations reveal that the tail extends beyond the orbit of the moon, maintaining a well-defined region in which the magnetic field reverses to separate oppositely directed fields. How far the tail extends is a question of interest since the possibility of accelerating particles in such neutral sheets results from annihilation of the

magnetic field. A commonly accepted theory of particle acceleration associated with solar flares suggests that this type of mechanism releases large amounts of energy stored in the intense but spatially limited magnetic fields on the solar surface. By analogy, it has been suggested that a flare in the earth's magnetotail may occur when the oppositely directed field lines annihilate each other; this would cause particles in the neutral sheet to accelerate and propagate into the auroral zones, generating visual auroras.

The Earth's Radiation Belts

We finally come to the radiation belts of the earth which are embedded deep within the magnetosphere. Although they occupy only a small fraction of the volume of the geomagnetosphere and its magnetic tail, nonetheless they represent a most important aspect of our space environment.

The motion of a charged particle in the geomagnetic field is known to consist of three components: a circular, or cyclotron, motion perpendicular to the magnetic field on a time scale of milliseconds; a motion in latitude parallel to the line of force, which causes particles to bounce between successive "mirror points" in northern and southern hemisphere regions on a time scale of seconds; and a drift in longitude resulting from the gradient and curvature of the magnetic field, which causes the particles to circle the earth on time scales of minutes to hours. These motions are periodic, and in the case of a stationary magnetic field can be described in terms of three constants of the particle motion. The general nature of the motion is essentially to spread the particles in concentric "shells" which parallel the magnetic lines of force. With explicit knowledge of the geomagnetic field and the flux at one point we can now predict the complete trajectory of particles.

Theoretical studies have recently shown that particles are trapped in certain regions of the magnetosphere (see *figure opposite*). The stable trapping regions are not symmetrical on the day and night sides of the earth, owing to the unsymmetrical distortion of the geomagnetic field caused by interaction with the solar wind and the formation of the geomagnetic tail. The "drift" motion resulting from field gradients of particles is very complex in the distorted geomagnetic field and a phenomenon referred to as shell splitting occurs. This references the motion of particles which on a common line of force on the noon side of the earth would drift in longitude and subsequently occupy separate lines of force on the night side (see *figure opposite*). Correspondingly, particles which have different mirror points but occupy the same line of force on the night side would drift in longitude on the day side to occupy different lines of force.

Complex regions of trapped particles result from the interaction between the solar wind and the earth's magnetic field, according to studies on models of the magnetosphere. The trapping regions are not symmetrical on the day and night sides of the earth owing to the unsymmetrical distortion that the solar wind causes in the magnetic field.

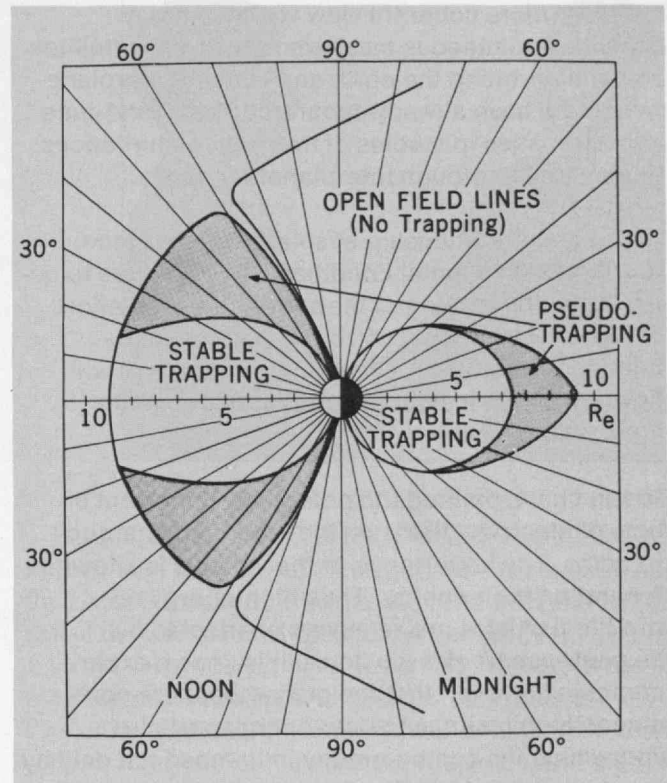
This shell splitting is responsible for pseudo trapping regions where particles are unable to drift 360° in longitude but are "lost" to the tail or the magnetosheath.

The pioneers investigating the magnetosphere concerned themselves with observations of the response of the geomagnetic field to solar disturbances. In recent years the study of magnetic storms with the aid of satellites has revealed a picture which relates favorably to that proposed by Chapman in his early studies.

The initial phase is known to be associated with a sudden change in the solar wind. The main phase of a geomagnetic storm, during which the terrestrial field decreases, is associated with an enhanced flux of particles trapped within the geomagnetic field. However, the altitude of these particles is now estimated to be only a few earth radii. As the magnetic storm develops, it is generally observed that the field in the magnetotail approximately doubles. At the same time the boundaries of the radiation belts drop to lower altitudes. The simultaneous observation of these events leads to the interpretation that the enhanced solar plasma, in addition to confining the geomagnetic field to a smaller region of space, also leads to an increased magnetic flux from the polar region, which extends into interplanetary space to form the geomagnetic tail. This is consistent with the observed simultaneous movement of the auroral zones towards the equator.

Detecting Planetary Environments

At present our understanding of the geomagnetosphere formed when the solar wind interacts with the earth is based mainly on satellite studies. A principal limitation in early experiments was the separation of space-and-time variations which were so intimately coupled with the measurements being performed on satellite trajectories transversing space in a single pass. The development of longer lived satellites and repetitive sampling of the same regions of space have led



to the far more coherent view we have today. Limited simultaneous measurements from satellites presently orbiting the earth and in deep interplanetary space have already separated space-and-time characteristics in studies of transient disturbances as they travel through interplanetary space.

The general relationship of solar weather to the earth's environmental conditions will continue to occupy a major fraction of the space research effort. However, the conduct of co-ordinated experiments on simultaneously operating satellites will provide unique insight into the birth and death of particle fluxes.

So far, I have omitted the potentially important effects of electrical fields on the motion of charged particles. The importance of these fields is known to depend on their energy. Thus high-energy relativistic particles are relatively unaffected by the presence of electric fields. It is known experimentally, however, that the magnetosphere contains a large reservoir of low-energy particles whose motions can be greatly influenced not only by the magnetic field of the geomagnetosphere, but also by its electrical fields. Future studies will indicate the full significance of these effects.

Recent flyby and landing missions to Mars and Venus by U.S. and Russian spacecraft have revealed that neither of these planets possesses a large-scale magnetosphere. The recent *Mariner 5* measurements indicate, however, the existence of a detached bow shock wave and a weak or possibly a pseudo-magnetosphere formed by the accretion of the interplanetary magnetic field by an ionosphere of Venus. The recent measurements from lunar orbit have failed to reveal the presence of a shock wave or pseudo-magnetosphere associated with the solar wind flow around the moon. Thus we have already delineated three separate classes of solar wind interaction with planetary objects ranging from minimum perturbations by the moon to significant perturbations by the earth.

The planet Jupiter offers the best opportunity for investigating magnetosphere effects similar to earth's in the solar system during the next decade. From radio observations we know that Jupiter possesses a magnetic field at least 10 times as intense as the earth's, and an immense radiation belt. Since Jupiter itself is very large the Jovian magnetosphere, if visible to an observer on the earth, would subtend an angle of approximately $\frac{1}{2}^\circ$, remarkably close to that of the moon and the sun.

Technological developments would permit us to explore Jupiter's magnetosphere within five years, if financial support were available. There is no doubt that such observations could improve our understanding of the environment of our own planet. Unfortunately, the events of the past summer have stripped N.A.S.A. of its ambitious projects to explore the planets in the early 1970's. However promising their space technology, space scientists must await a fairer budgetary climate before they can plan to continue to probe planetary environments in our solar system.

Dr. Ness directs a group studying problems of extraterrestrial physics, including the interplanetary medium and planetary-lunar environments, at the National Aeronautics and Space Administration's Goddard Space Flight Center. He received S.B. and Ph.D. degrees from M.I.T. in geophysics in 1955 and 1959. Since joining N.A.S.A. he has been principal investigator for magnetic field experiments on many satellites studying the magnetic fields in space.

Read Goode's idea led to an extra \$250,000 in business in a single year.

His idea was Greg Porter.

R. Gregory Porter, III (Virginia Polytechnic Institute '64)
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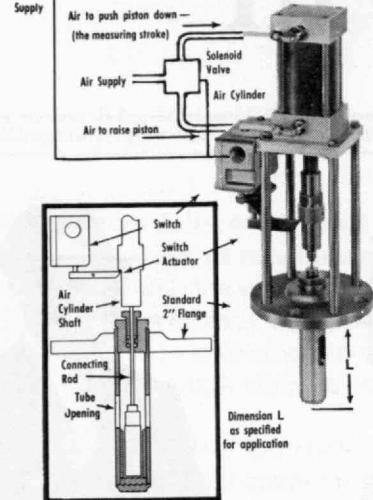
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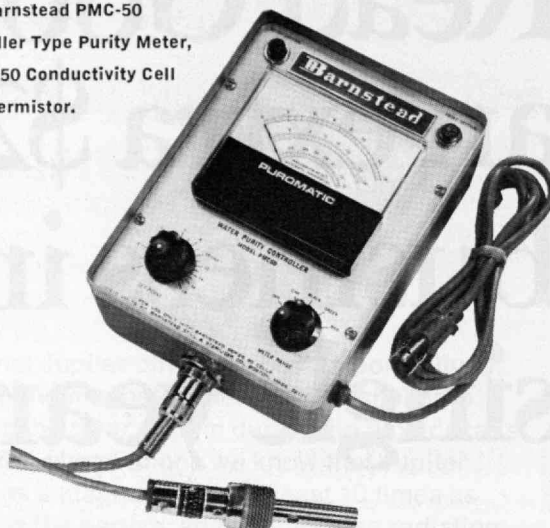
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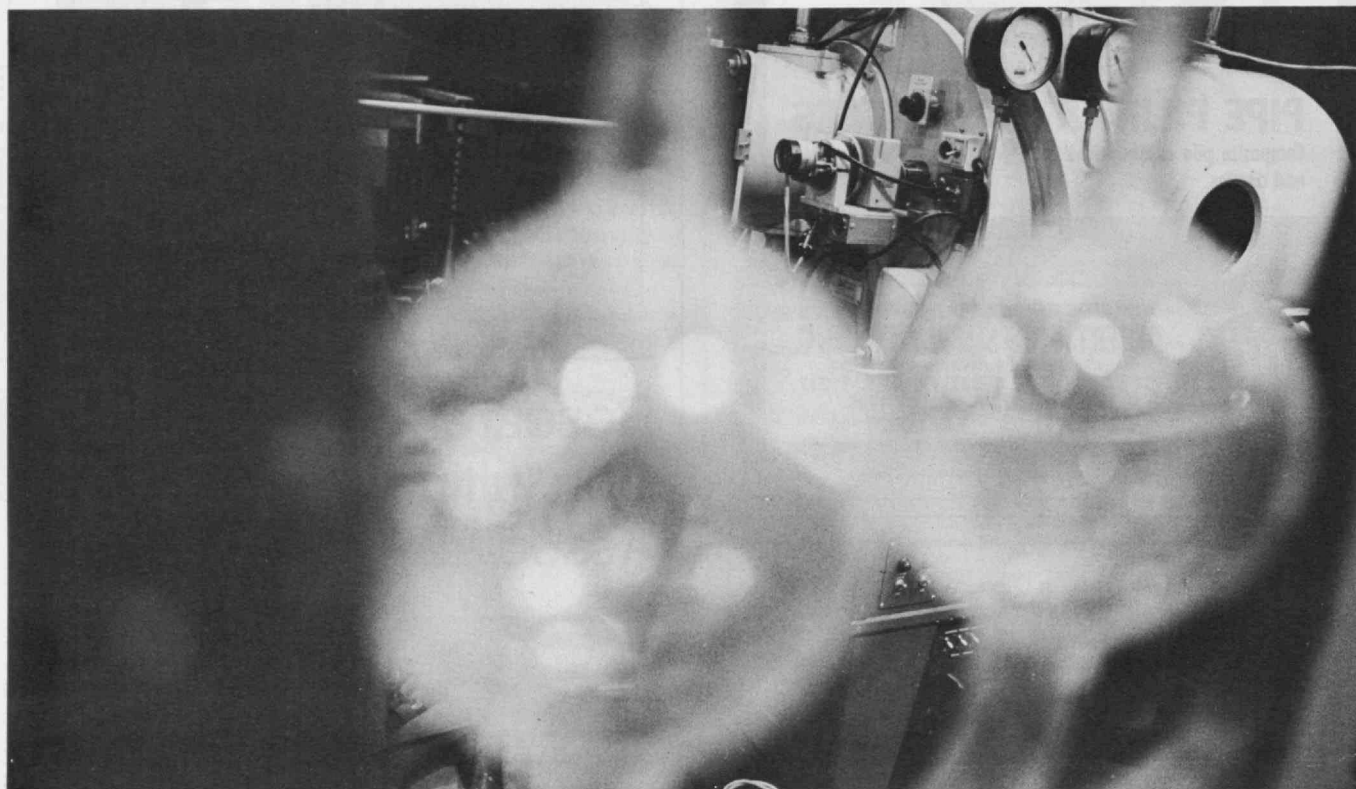
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Trend of Affairs

N. M. L. Rededicated



M.I.T.'s National Magnet Laboratory was rededicated last fall to the memory of the late Francis Bitter, a pioneer in high-field magnetism and a member of the M.I.T. faculty for 33 years until his death last July. A day-long symposium reviewing the history and current trends of research in magnetic fields preceded the formal rededication of the laboratory by M.I.T. President Howard W. Johnson.

Francis Bitter was one of the early entrants to research in high-field magnetism—the use of very strong magnetic fields to probe fundamentals of atomic structure either when the atomic magnets are so weak that normal magnets have no effect on them or when internal magnetic fields in materials are so strong that they mask the effects of normal external fields on the atomic magnets. In the late 1930's Dr. Bitter developed a water-cooled solenoid which, using 1.7 megawatts of D.C. power, attained a continuous magnetic field of 100,000 gauss, the highest achieved at that time. (By comparison, the earth's field is about half a gauss.) Even today, Bitter solenoids remain the bases of the hardware of most high-field magnets.

The collaboration which led to the National Magnet Laboratory began in the middle 1950's. At that time the Lincoln Laboratory's Solid State Division, headed by Benjamin Lax, Ph.D.'49, was studying the solid state using pulsed magnetic fields. Realizing that continuous high fields offered better prospects for scientific dividends, Dr. Lax persuaded the Air Force Office of Scientific Research to sponsor a joint effort between his group and Professor Bitter's, starting in 1957. Out of this enterprise grew the National Magnet Laboratory, with Dr. Lax as Director, which was established in 1960 and housed in its present building in 1963.

The Laboratory is operated by M.I.T. with support from the U.S. Air Force Office of Scientific Research. Its mission is to equip a high-magnetic-field facility and to conduct research into the properties of matter in intense magnetic fields. As a unique establishment, internationally as well as nationally, its doors are open to scientists from all over the world.

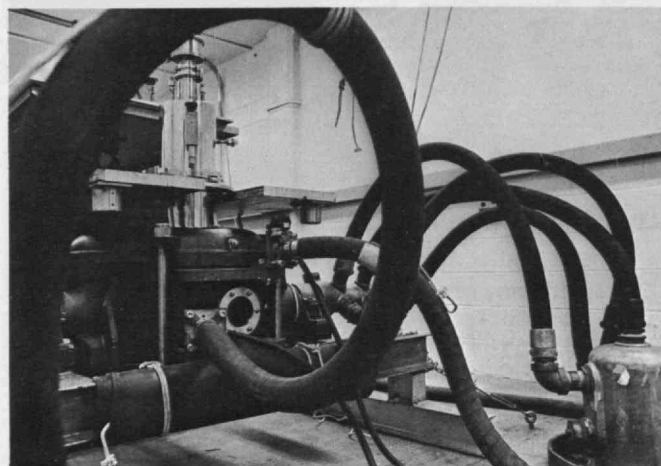
The power for the Laboratory's magnets is supplied by the Cambridge Electric Light Company. Four generators



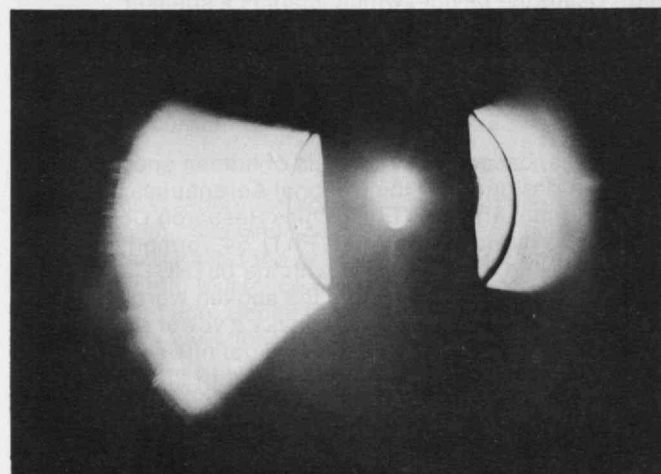
Views of hardware in M.I.T.'s National Magnet Laboratory, rededicated last fall to the memory of the late Francis Bitter, one of the pioneers of research using high magnetic fields. The Francis Bitter National Magnet Laboratory is the leading facility of its kind in the world; at the rededication ceremony (left) Laboratory Director Benjamin Lax, Ph.D.'49, described the laboratory's progress as the continuation of Bitter's lifework. (Photos: Ivan Massar, Black Star)

in the laboratory converting A.C. into D.C. can produce 10 megawatts of continuous power, and flywheels can be used to store sufficient energy to give 32 megawatts in a three-second burst.

The outstanding feature of the Francis Bitter National Magnet Laboratory is, needless to say, the range of its magnets, both in number and potential power. While probably three other laboratories in the world—the Naval Research Laboratory, the Royal Radar Establishment in England and the Lebedev facility in the Soviet Union—can attain magnetic fields as spectacular as those of the N.M.L., only the N.M.L. has the depth represented by about 25 magnets which can reach fields over 100 kilogauss. In fact, the Laboratory carries out more research at fields of 100 kilogauss and above than do all other facilities in the world put together. The Laboratory also has the world's highest-field continuous-duty magnet, which consumes all the power available in attaining 250 kilogauss.



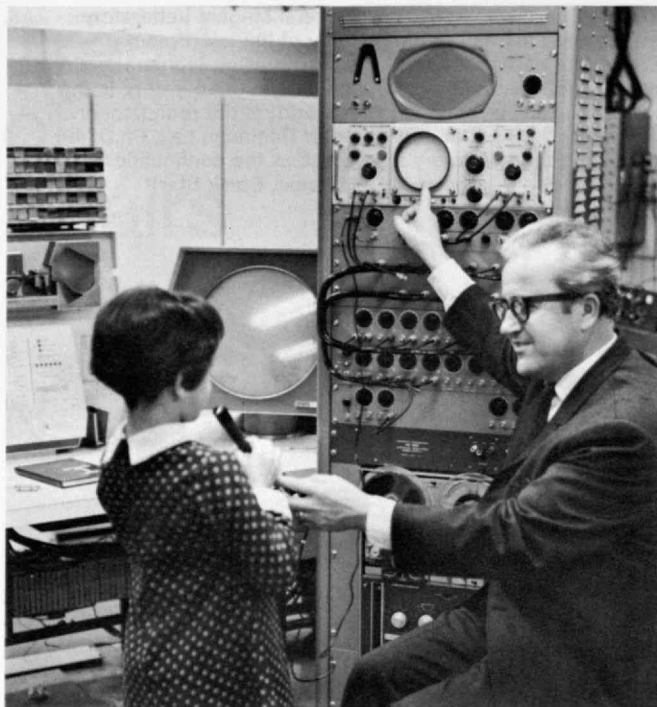
One of the Magnet Laboratory's pioneering projects at present is the development of a hybrid magnet, in which conventional high-field magnets are combined with a superconducting magnet to produce a high field at great saving in power. The M.I.T. project aims at a field of 235 kilogauss using five megawatts, half the Laboratory's available power. A 60-kilogauss superconducting magnet, which requires very little power, will surround two conventional copper magnets which produce 75 kilogauss and 100 kilogauss. The hybrid magnet, which should be operating sometime this year, will undoubtedly be the forerunner of a series.



Another project which should reach completion in 1968 is the development of a magnet which will produce a field of 300 kilogauss in a two-second pulse, using the 32 megawatts available in the flywheels attached to the Laboratory's generators. The magnet will be used to investigate the possibility of performing experiments impossible using shorter pulses. Eventually the power required may be halved by incorporating a superconducting magnet, and the development could lead to a magnet producing 300 kilogauss continuously.



At the dedication ceremony Brigadier General Leo A. Kiley, '39, Deputy Director of Development in the Office of the Deputy Chief of Staff, Research and Development, U.S.A.F., said that the Air Force is "justly proud of the facility," which he described as a vital world center for research into materials in high magnetic fields. "The creative talent of the team at the Laboratory," he continued, "has given the United States a substantial lead in this field of physics."



Nine-year-old girl, deaf since birth, sees her voice on an oscilloscope screen. When she speaks a vowel sound, the dot on the screen moves to a particular region of the screen; she aims to move the dot to the region associated with correction pronunciation of the vowel. The machine is producing spectacular results in teaching the deaf to speak more clearly. Instructor is Husevin Yilmaz, Ph.D.'54, who designed and built the system. (Photo: N.A.S.A.)

Voice through Vision

A device designed to translate voice commands from astronauts into actual performance by spacecraft hardware is producing unexpected dividends for the deaf. Using the device, which enables a speaker to "see" his voice on a display screen, deaf people are quickly learning to speak more clearly and to pronounce sounds that they previously found unattainable.

The device, based on an analysis of human speech, has been designed for the National Aeronautics and Space Administration's Electronics Research Center in Cambridge by Husevin Yilmaz, Ph.D.'54, formerly of Arthur D. Little, Inc., and now with the MITRE Corporation. It displays profiles of the spoken word on an oscilloscope. When a subject speaks a vowel sound into a microphone, a dot moves to a definite sector of the oscilloscope screen; each sector of the screen corresponds to a different vowel sound.

N.A.S.A. hopes eventually to use this device as the basis for a voice command system, so that an astronaut could maneuver his vehicle merely by speaking appropriate commands into the microphone. But in the meantime, the machine has proved valuable in speech training for the deaf, by showing them how the electronic dot moves on the oscilloscope in response to their spoken vowel sounds, in comparison with the dot's position when the same sounds are pronounced by others. The deaf quickly condition themselves to produce correct pronunciation.

Associates of Dr. Yilmaz have tested the machine on a group of deaf and partially deaf children in Lexington, on a class of retarded children, and on a high school boy with a severe stutter. The results have been spectacular: a totally deaf adult who had never been able to pronounce a broad "a" correctly did so after 10 minutes on the machine; a 13-year old retarded child

pronounced three vowel sounds for the first time using the device; and another student conditioned himself to pronounce a word on which he had previously always stuttered.

Dr. Yilmaz is now working on the problem of representing consonant sounds on the display. He told *Technology Review* that his research has already shown that his general perception theory, originally developed in understanding color vision and vowel sounds, holds up for consonants; scientists now understand how humans recognize sounds, at least on the level of phonemes, the fundamental pieces of speech. In Dr. Yilmaz' belief, translation of this understanding into the appropriate hardware to display speech should not represent too difficult a step. And a machine which can display both vowels and consonants will give scientists a "valuable tool for a fresh approach to speech therapy."

Learning by Games

Conventional education rarely relates to the real-life situation of the student. Most students treat this fact as a minor hurdle in their educational course, but to students who drop out from formal education and find their way into the antipoverty program it represents an insurmountable barrier. Unfortunately, the teachers and the educational attitudes in the antipoverty program are often just the same as those in public education—and, not surprisingly, so are the results. In fact, youngsters who take the effort to enroll in the antipoverty program require a different educational approach, which relates to life as they know it; it is here that educational games have an important role.

These views were expressed by Stephen A. Bornstein, '65, of Abt Associates, Inc., a pioneer firm in the application of technology to social problems, addressing an operations research seminar at M.I.T. in November. Educational games, he said, have the particular value of inducing students to participate in situations similar to those they encounter in the real world.

The typical educational game gives its participants, who act assigned roles, competing objectives in the presence of scarce resources; students find themselves in conflict over their individual objectives. The context of the game is educational; *Manchester*, for example, illustrates the migration of workers from country to city. Students in this game take the parts of laborers,

who negotiate for their services, and farmers, squires and millowners who aim to gain the maximum resources at the lowest cost. And as in much of our life today, the ultimate object is to make as much money as possible.

The role-playing demanded of students in such games pays immediate dividends for the student in the anti-poverty program, continued Mr. Bornstein. Participation in the educational process is intrinsically more interesting than orthodox learning, and, more important, such participation gives students experience in selling themselves—experience they can use to advantage when they encounter interviewers, personnel managers and administrators.

So far, the enthusiasm of the small number of groups involved in creating educational games has not reached educational administrators. Teachers complain that they lose control of classes playing the games, and very few games have penetrated the antipoverty program. Mr. Bornstein foresees two possible channels through which educational games might reach respectability—inclusion in the curricula of publishers and coverage in schools of education.

Academic Dilemma

The modern university faces a dilemma. It must respond to the demands of society with major intellectual and physical resources to solve urgent problems; and at the same time it must maintain the commitment to human values for which universities have stood since the Middle Ages. Today's urban crisis aggravates what James R. Killian, Jr., '26, calls the universities' schizophrenia because it presents them with a kind of ultimate challenge—a demand far more pervasive than the problems of national defense on which the universities pioneered their major contribution to urgent national needs.

The urban crisis is a special challenge because it must involve a powerful technology working in concert with the social sciences, the arts, and the humanities—a combination of capabilities which are uniquely represented in the universities in America. The schizophrenia arises, Dr. Killian said in his Ferguson Lecture at Washington University late last fall, because this strongest of all challenges to the nation's wisdom may by its overwhelming urgency and complexity "imperil the primary mission of the university and its central preoccupation with the student" and with basic knowledge. The answer, he believes, will be new kinds of academic organization and new relationships between universities, industry, government, and the new forms of nonprofit research institutions.

Dr. Killian reviewed the universities' experiences with such interdisciplinary laboratories as M.I.T.'s Research Laboratory of Electronics; he suggested the usefulness of not-for-profit research groups such as the MITRE Corporation, and he also commended proposals to establish new national socio-technical institutions on the pattern of such existing national laboratories as Brookhaven or Oak Ridge. All of these, he said, may be appropriate. Universities must participate in most of them, and in all of them engineers must have the central role. "As never before, our

society must look to the engineer and the institutions which educate him to provide leadership in putting technology to beneficent and aesthetic use. The high mission of the engineer today is not only to create new technology and to put it to work but to lead in making technology the servant of man's highest aspirations and of our society's total welfare."

Changing Climate

Astronomers know that the earth's orbit around the sun is not precisely circular, and that the tilt of the earth's axis of rotation oscillates slightly; and climatologists have a long-standing theory that these two factors combine to create periodic changes in the earth's climate. Now Wallace S. Broecker of the Lamont Geological Laboratory of Columbia University has found geological evidence which neatly supports the theory in almost every detail.

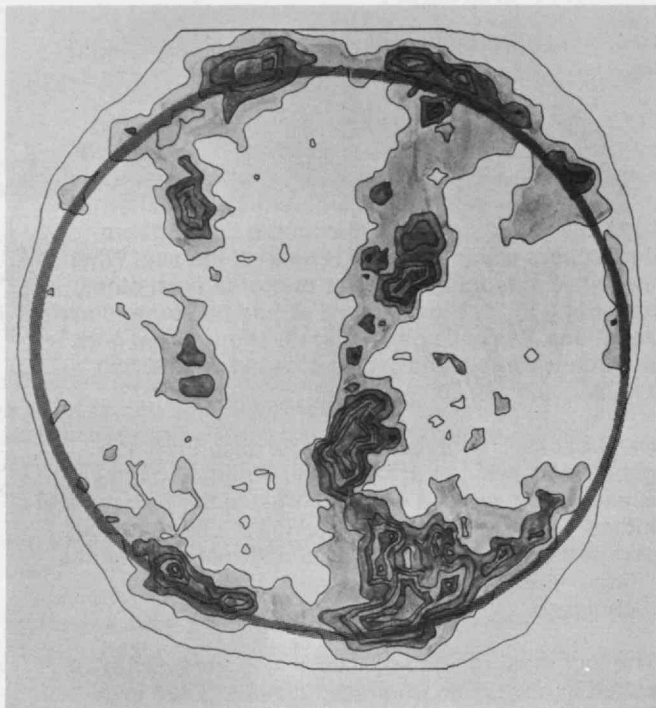
When the earth's axis is most nearly vertical, the sun's rays strike with greatest power; this occurs in a cycle of about 40,000 years. The earth's precession in its orbit superimposes a different cyclic pattern: in 11,000 years summer will occur in the northern hemisphere when the earth is nearest the sun. When these two independent cycles reinforce each other, according to the theory, there should be strong climatic variations. For example, the earth should have gone through warm-climate cycles some 11,000, 80,000, 115,000, and 130,000 years ago.

Dr. Broecker's evidence, which he described at a geophysics seminar at M.I.T. this winter, is on the island of Barbados, a coral upthrust in the British West Indies. There he has found a series of coral terraces, exposed by the island's general upthrust, and he has "dated" the coral in each by radioactive-decay techniques.

The four most recent terraces, which presumably resulted in each case when rising levels of sea level began to recede and halted the growth of the coral formations, came into existence 80,000, 105,000, 120,000, and 220,000 years ago. Because ice caps are melted, warm-climate variations are associated with rising heights of sea level, and Dr. Broecker believes that, given the time delays involved and the accuracy of all the computations, there is an "amazing parallelism" between his observations and the climate changes predicted by theory. It is, he says, the first piece of geological evidence marshaled in support of the Milankovitch Theory.

But one anomaly remains. Following the earth's most recent ice age, some 18,000 years ago, there was a theoretical maximum of solar radiation about 11,000 years ago. There is ample geological evidence to show that the sea level rose appropriately in this period. But since then the level of the oceans—which is determined by the size of the earth's ice caps and hence by the earth's climate—has remained essentially unchanged. Why? Perhaps, said Dr. Broecker, there is a dynamic system within the oceans such that a relatively minor climatic change triggers a major change in circulation and eventually in temperature; and we are now in the midst of some such cycle that we do not yet fully understand.

Scan of the sun by the Harvard College Observatory's ultraviolet spectrometer, mounted on Orbiting Solar Observatory-IV. In its location above the earth's atmosphere, the instrument can record at wavelengths invisible to earth-bound techniques. This picture shows the sun scanned at the wavelength of magnesium-10, a magnesium atom which has lost nine of its electrons. Since this process occurs only at temperatures around 1.5 million degrees, the scan gives an indication of temperatures in the sun's corona as well as the distribution of chemical elements there. The darkness of the contour indicates the relative amount of magnesium-10 present.



New View of the Sun

An orbiting observatory which can photograph the sun in ultraviolet light is providing astronomers with totally new information about the sun and its atmosphere. The photographs have revealed fresh details about the chemical composition and distribution of temperatures within the sun, which will probably modify present theories on the origin and evolution of sunlike stars.

The ultraviolet spectrometer responsible for these measurements is mounted aboard Orbiting Solar Observatory-IV which went into a 350-mile orbit around the earth on October 18 last year. Leo Goldberg, Edmond Reeves, and William Parkinson of the Harvard College Observatory are responsible for the experiment, whose engineering was carried out by a team headed by Nathan L. Hazen, '56, and Jacob Rechavi.

The Harvard photographs are unattainable except from satellites, for the wavelengths in which they are taken cannot penetrate the earth's atmosphere. The

measurements indicate both the chemical composition and the temperature of the sun in two ways: by recording a small spot in the solar disc over the whole ultraviolet spectrum, and by scanning the whole disc at a particular wavelength, which indicates the distribution of one particular element or ion.

In addition to the opportunity to view the sun in a new spectral region, the Harvard experiment gives astronomers the chance to survey the sun's upper atmosphere—the corona—across the whole of the solar disc for the first time. Previous views of the corona have had to be snatched during total eclipses of the sun, and astronomers at these times have only been able to view the edge of the disc.

An important facet of the orbiting observatory's program is the study of solar flares, during which harmful radiation shoots out into space and produces such effects as the northern lights and magnetic storms. Since ultraviolet radiation accompanies flares, the Harvard spectrometer will be able to record the occurrence of flares and follow their movements through the corona. Such data will undoubtedly help astronomers to unravel the mechanism responsible for producing these strange bursts of energy.

X-ray Galaxy

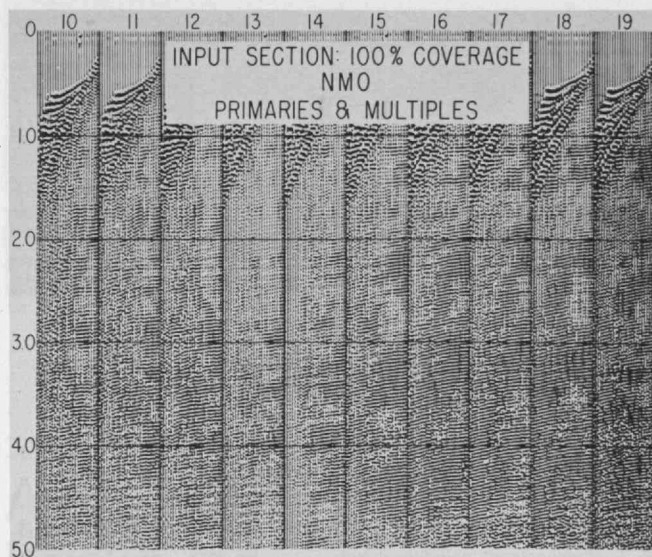
In the five years since the first x-ray source outside the solar system was discovered, astronomers have only been able to associate a small number of such sources with visible objects. An M.I.T. group has recently confirmed one such identification by measuring x-rays which appear to emanate from the radio galaxy known as M-87, 33 million light-years from the earth in the constellation Virgo. So far, this is the only source of x-rays known outside our own galaxy.

M-87 is one of the brightest radio sources in the sky; when viewed through a telescope it appears spherical in shape but contains an intense jet which projects from a core near its center. A team at the Naval Research Laboratory in Washington, D.C., led by Herbert Friedman, first identified it as a source of x-rays in 1965. This team confirmed the observation early in 1967.

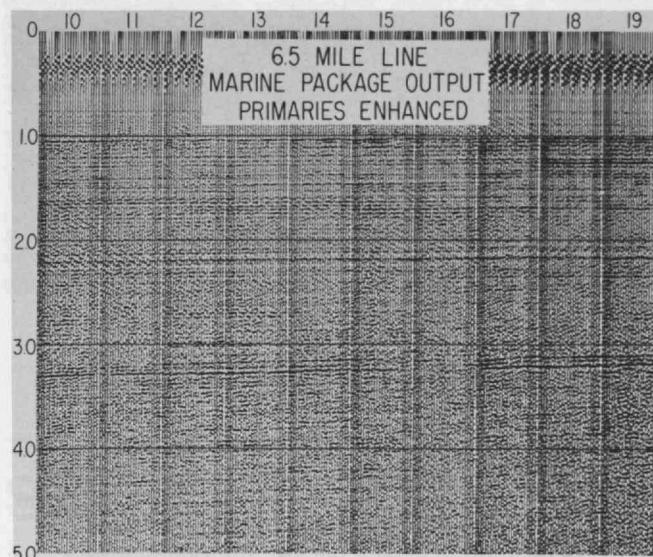
The M.I.T. measurements on M-87 took place during an Aerobee rocket flight from White Sands Missile Range in New Mexico in July, 1967. The results were reported recently to an American Physical Society meeting in New York by Hale V. Bradt, Ph.D. '61, Assistant Professor of Physics at M.I.T., and Gianfranco Spada of the M.I.T. Center for Space Research. The team located the x-ray source in a region of the sky about two degrees in diameter with its center about half a degree from M-87. Although the reading is insufficiently accurate to identify M-87 uniquely as the source of x-rays, the strange character of this galaxy suggests that almost certainly it is emitting them.

Dr. Spada also reported more precise locations for a number of x-ray sources in the Sagittarius constellation; optical astronomers are now searching photographic plates for evidence of optical stars corresponding to the sources, with the final aim of understanding the nature of these new sources of energy in the heavens.

Original (left) and processed (right) print-outs from a six-mile seismological traverse reveal how unintelligible data can be made to reveal structural detail by the application of statistical correlation methods. The five seconds of travel time represent a penetration to about six miles' depth. Each of the ten 24-trace records on the left represents the seismic return from an explosive source, as recorded on 24 transducer arrays at increasing distance (right to left) from the source; a "normal moveout correction" (a time-varying stretching of the data time base dependent on source receiver distance) has been applied to remove the variable time delay due to horizontal offset between source and receiver for primary reflections from subsurface reflecting interfaces. The sinusoidal nature of the data is due to the reverberation of the energy from the subsurface in the water layer. The large residual offset-dependent time delay apparent is due to the fact that most of the subsurface energy return below one second results from multiple reflections with the shallow portion of the subsurface.



The result shown on the right has been "deconvolved" to reduce the reverberation effect; a filter is designed for each data trace based on the autocorrelation function of the trace. In addition, data from six different source-receiver offsets have been combined to form each trace on the right by means of a continuously time-varying multichannel filter designed to separate primary energy from multiple energy on the basis of their difference in "normal moveout." Only two significant deep reflectors, at about 2.2 and 3.2 seconds, are revealed. Much of the other energy is residual multiple energy and noise.



Computer Seismology

The power of communication theory and statistical correlation techniques has moved digital computers into the field with the petroleum industry's seismological teams. Though its full potential is yet to be tapped, this kind of data analysis represents a "significant change in the state of the art of reflection seismology," Milo M. Backus, '52, of the Science Service Division of Texas Instruments, Inc., told an M.I.T. seminar late this fall. According to Dr. Backus, seismology is our "most effective" technique for subsurface exploration.

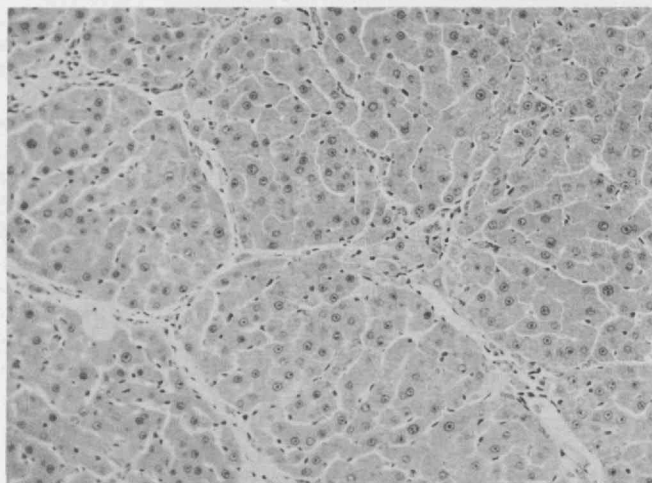
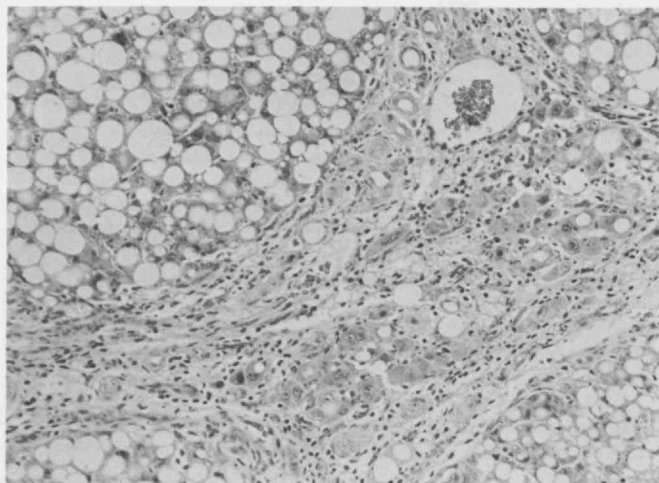
Using digital computers to analyze and correlate a vast number of variables, seismologists can arrange increasingly large arrays of signal detectors in association with a single seismic transmitter. To map the subsurface under one square mile may now involve as many as 25 million data words, and converting a 20-mile traverse into a single subsurface picture may require as many as four to six billion computations. By analyzing redundant data, the computer helps reinforce the useful signals from underground layers, eliminates irrelevant "noise" signals, and analyzes time shifts and spurious reflections which result from discontinuous variations in subsurface lithology. The computer also improves the accuracy of seismological systems; differences as small as a millisecond in the arrival of signals generated at 25 cps can now be studied and correlated

in the analysis of underground features. Indeed, errors in surveying the locations of marine seismic transmitters and receiver elements limit the accuracy of the final data and the navigation data can be upgraded by use of the subsurface data.

Already these techniques have extended seismological methods to the subsurface mapping of many areas where adequate signals could not be obtained by conventional methods.

Further refinement and extension of computer applications are now yielding a three-dimensional subsurface mapping system, but the information-processing requirements appear to be so high that the most recent advances in computer technology will be required to make such a system economic for wide application. To obtain three-dimensional data on material underlying a square of eight kilometers can require 240 million data words and 50 billion computations. Yet, said Dr. Backus, it is clear that computers have only begun their service to seismologists, and increasing system complexity will be a fact of life for future seismic teams. There remains at least 20 per cent of the earth's subsurface of interest to seismologists for which adequate seismological data are not yet possible.

Alcoholism and cirrhosis of the liver may not have the direct cause-and-effect relationship which many medical workers believe, after all. Dr. W. Stanley Hartroft of The Hospital for Sick Children in Toronto told an M.I.T. seminar early this winter that, given a background of optimal nutritional balance, alcohol is no more harmful to the liver than sugar. Indeed, the cirrhosis of rats with fatty livers such as that in the left micrograph regressed in three months to the conditions in the right micrograph when the rats were fed "superdiets" which fulfilled their total nutritional requirements while giving 40 per cent of their total caloric intake in the form of alcohol.



Eat, Drink, Be Merry

Dr. W. Stanley Hartroft of The Research Institute of The Hospital for Sick Children and The Department of Physiology of the University of Toronto, came to M.I.T. in December with this controversial message of good cheer: consumed against a background of optimal nutritional balance, alcohol is no more harmful to the liver than sugar. Indeed, in some experiments conducted in his laboratory by Dr. E. A. Porta, Associate Scientist in the Institute, alcohol in amounts up to 40 per cent of total caloric intake failed to inhibit the regression of cirrhosis in rats; those on the alcoholic regimen did as well as those fed a nonalcoholic control diet of the same nutritional pattern.

Early research on the relation of alcohol to cirrhosis may have erred, Dr. Hartroft believes, because alcohol was usually substituted for a single caloric source such as carbohydrate in the test rats' diets. And the same kind of substitution may occur in humans who consume appreciable amounts of alcohol. Because even up to 60 to 70 per cent of their daily caloric intake may come from alcohol, they may fail to maintain an adequate balance of protein, fat and carbohydrate in relation to the total calories consumed—including, of course, those derived from the alcohol itself, Dr. Hartroft believes. "We do not think that cirrhosis—or even a fatty liver, the first stage in the development of this type of cirrhosis—can be produced in rats if the background diet is well balanced and completely adequate in relation to the total caloric pattern. But a fatty liver can definitely be produced if the normal fat-carbohydrate-protein ratio is altered even without the addition of alcohol to the animals' diets," he said.

Dr. Paul M. Newberne, Professor of Nutritional Pathology at M.I.T., called it "... a very encouraging development."

Audio Pollution

Noise may keep mass transportation out of a community and passengers out of its turnstiles. And noise reduction is expensive—sometimes prohibitively so—or simply impossible in terms of the present state of the art.

In California-style neighborhoods, 90 PNdB (perceived noise decibels) would lead to sporadic complaints, but with 100 PNdB "threats of community action should be expected," writes Vincent Salmon, Ph.D.'38, in the *SRI Journal* of Stanford Research Institute. These are weighted figures, with the following added or subtracted on the basis of psychological factors: add 5 PNdB when pure sounds (as wheel squeal on curves) are prominent; add 5 PNdB if sudden sounds predominate, such as emergence from a tunnel; when an event occurs only once a day, subtract 25 PNdB; for noise at night—when people are sleeping or trying to—add 5 PNdB; if noise occurs only in the daytime or in winter (windows closed), subtract 5 PNdB; add 5 PNdB for rural conditions (low background noise) but subtract 15 PNdB for noisy urban conditions. Inside the car, passengers will complain when noise interferes with conversation, and a standard noise rating (NR) of 60—conversational voice intelligible at two feet—is a reasonable goal at which to aim.

Noise sources are omnipresent, Dr. Salmon says. Poor maintenance of wheels and rails can increase noise by 15 PNdB. With solid axles one wheel must slip as the system rounds a curve, and wheel squeal "remains a largely unsolved problem of railed vehicle systems."

"The noiseless system will never be built," concludes Dr. Salmon, "as long as there are ears to hear it. But we can at least be interested in people ... as humans whose needs are to be fulfilled without exacting the tribute of air polluted with audio smog."

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Institute Review

Tuition and "the Widening Gap"

M.I.T.'s comprehensive tuition will increase from \$1,900 to \$2,150 per academic year beginning in the fall of 1968. At the same time, funds available for scholarships, fellowships and loans will be increased, and there will be no change from this year's charges for room and board in the Institute houses.

In making these announcements early in December, President Howard W. Johnson attributed the increased tuition to the "widening gap between revenues and expenses, the relentless upward pressures on our educational costs. The Institute is committed," he wrote to all students and their parents, "to providing an education of the highest quality, and it is committed also to our independence of operation. The most difficult part of such a decision for me," he said, "is my deep-seated concern that education at M.I.T. be open to the best qualified students regardless of financial resources. I want to stress our determination now to provide, for both undergraduates and graduate students, funds for scholarships, fellowships and loans to minimize the impact of the tuition increase on those who require aid."

Direct academic expenses have more than tripled since 1956, President Johnson told *The Tech* at a press conference on the tuition increase. But, he said, "intensified efforts are increasing M.I.T.'s funds from sources other than tuition"; as a result, he said, total tuition income ran about \$6 million behind academic expenses last year. "Unfortunately," President Johnson said, "as we now project our costs for 1968 and beyond, income from these sources will not be enough to meet all the rising educational expenses of the Institute."

Jack H. Frailey, '44, Director of Student Aid, reported in connection with the announcement that M.I.T. undergraduates received \$2,362,000 in scholarship aid and \$1,606,000 in loans—a total of nearly \$4 million and a 27 per cent increase over the previous year—in 1965-1966. Because of the prospects for continued increase in educational costs, he said, the Institute is seeking \$2 million additional

scholarship and loan funds immediately, part of a "long-term plan to augment substantially" the \$27 million in endowment now available.

M.I.T. students greeted the tuition announcement with a kind of *pro forma* riot which Steven C. Carhart, '70, writing in *The Tech*, called "the greatest hack of all time." ("It's either this or I tool," an unidentified student told Mr. Carhart.) It began on East Campus, moved across Massachusetts Avenue (traffic jam) into the Student Center library and then in turn to McCormick Hall, the President's House, and finally McDermott Court. By 12:05, wrote Mr. Carhart, the demonstration "had run out of places to go."

In an editorial, *The Tech* noted that "the villain of the piece is not M.I.T., for the problem of increasing costs and subsequent tuition increases affects all privately endowed universities. The plight of the private institutions is becoming critical," the editor said. In connection with its coverage of the increase, *The Tech* published a list of tuition figures at other schools with which M.I.T. shares many applicants, including Bowdoin, \$2,250; Cornell and Dartmouth, \$2,200; California Institute of Technology, \$2,198; and Brown, Yale, and Princeton, \$2,100.

Federal Management

Thirteen officials from 11 federal agencies are spending the current year at M.I.T. studying modern techniques of systems analysis in a program co-sponsored by the Center for Advanced Engineering Study and the Department of Political Science. The work is built around a core of instruction dealing with engineering systems analysis, planned program budgeting, cost-effectiveness analysis and systematic policy analysis. However, each participant is permitted to tailor his study to his particular agency and his individual responsibility.

The program is an outgrowth of a federal effort to have all government agencies use the management, budget control and program planning techniques introduced into the Department of Defense by Secretary Robert S.

McNamara. The M.I.T. program participants come from the Departments of Agriculture, Health, Education and Welfare, Housing and Urban Development, Interior, Labor, Post Office, State, and Treasury; the U.S. Army; Civil Service Commission; and Federal Aviation Agency. Government support for the program will continue at least another two years.

LINAC Contract

The Atomic Energy Commission has awarded a contract for construction of buildings and a tunnel to house the 400-Mev. linear accelerator which M.I.T. will install and operate at Middleton, Mass.

Joseph E. Bennett Company, Inc., of Needham, Mass., is the successful bidder, and work is in process under the administrative and engineering direction of the A.E.C.'s New York Operations Office. The contract calls for construction of a 600-foot-long concrete-lined underground tunnel, shielded with 15 feet of compacted earth, in which the LINAC will be installed. Parallel to the tunnel will be the radio-frequency gallery, and there will also be a well-shielded 50 by 65-foot target and research structure, plus a 128 by 72-foot office and laboratory building.

The accelerator is scheduled to become operational for scientific research early in 1970. It will permit the "performance of basic research on the structure of complex nuclei and provide significant new data on the nature of forces that determine nuclear behavior," according to the A.E.C.

Never Trust a Psychologist

From Michael Warren's ('69) "Footnotes" in *The Tech*: "Students taking 9.60 (Personality Structure and Development) were slightly surprised last week when they walked in to take their midterm exam. A considerable number were bleary-eyed, having stayed up most of the night reviewing the 1000-odd pages of material the test was to have covered. The professor entered the room, summarily cancelled the exam, and explained, 'You can never trust a psychologist.'"

Its youngest residents (in the nursery school, center bottom) were the first to be "at ease" in Eastgate, M.I.T.'s new 30-story apartment house for married students and faculty. The building was dedicated at an informal luncheon in the penthouse lounge this fall (center picture).

It's Only Number Two

Though it has been occupied since September, the 30-story Eastgate apartment for married students and faculty was opened officially only on November 30, when M.I.T. and Cambridge officials met for a ceremonial luncheon in the building's penthouse lounge. Eastgate, already fully occupied, is Cambridge's second tallest building—shorter by only 12 feet than M.I.T.'s Green Building which takes first honors.

Howard W. Johnson, President of M.I.T., speaking at the opening ceremony, called Eastgate's completion "a high point" in M.I.T.'s efforts to create "a new and vibrant community." Reviewing the many town-and-gown relations in Cambridge, James R. Killian, Jr., '26, Chairman of the M.I.T. Corporation, pledged the Institute's "determination to multiply the ways in which we try to be a good citizen of Cambridge." He cited its participation in studies of urban affairs, its encouragement to such public and private ventures as Technology Square and the N.A.S.A. Electronics Research Center, its co-sponsorship of the Cambridge Corporation with the primary mission of increasing the housing stock of Cambridge, and the many services of student groups as volunteer tutors, sponsors of youth programs and other neighborhood activities.

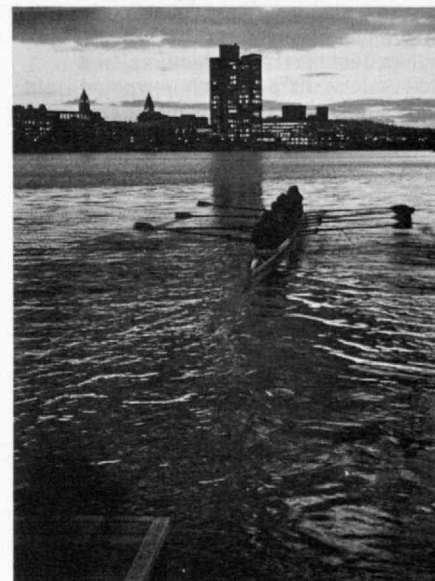
The Eastgate tower, which dominates Kendall Square from the M.I.T. Sloan Campus, contains 204 one- and two-bedroom apartments, over 75 per cent of them allocated to married students, the balance to faculty. By this arrangement, M.I.T. hopes to enlarge opportunities for interaction between teachers and students. The building cost \$4 million, financed by a self-liquidating loan from the U.S. Department of Housing and Urban Development and a private gift by associates of Grover M. Hermann, Chicago industrialist who made possible the adjacent Hermann Building.

Eastgate's architect was Eduardo Catalano, Professor of Architecture at M.I.T., in association with E. Crawley Cooper, M. Arch.'59, Robert Brannen and Paul Shimamoto, M. Arch.'61, of Cambridge. Construction was by Vappi and Company, Inc.



The Fassett and the Hamilton

M.I.T.'s fall crew season was enlivened by the arrival of two new shells, promptly christened in honor of Frederick G. Fassett, Jr., Dean of Residence, Emeritus, and Leicester F. Hamilton, '14, Professor of Analytical Chemistry, Emeritus. Both came to the new Pierce Boathouse for the traditional ceremonies and then joined guests watching one of the new shells sail into a brilliant Charles River sunset (below).



Two Ferraris and the MIT-X

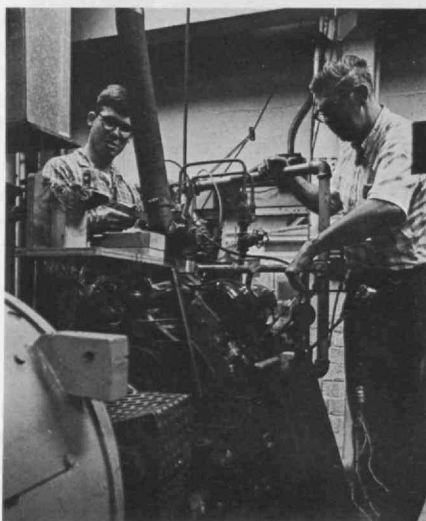
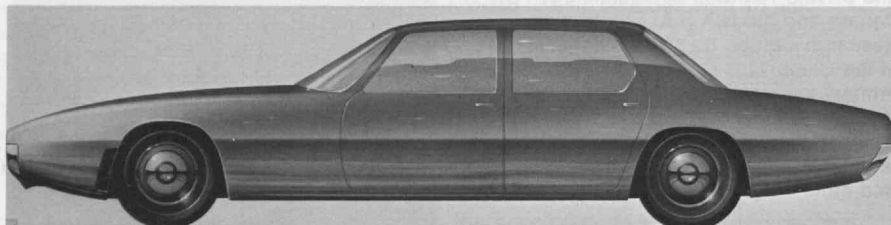
When *Sports Car Graphic* magazine inaugurated a series on sports cars on campus, it came first to M.I.T. where the editor found "a weird world of egg-heads," undergraduate designs for a "dream car" called the "MIT-X," a professor who remembered one of his students—a former President of M.I.T. Sports Car Club—who owned two Ferraris, and a student (Fred R. Kern, '65) who redesigned the front of his Pontiac GTO after running aerodynamic tests in an M.I.T. wind tunnel.

E. Eugene Larrabee, S.M. '48, Assistant Professor of Aeronautics and Astronautics, gives his students in Automotive Vehicles a co-operative design problem which quickly reveals the "inherent conflicts among solutions to different problems," said Jerry Titus, Editor of *Sports Car Graphic*. Projects are spread throughout the class—some students design the engine, others the body, interior, or suspension—but everyone works together to be sure that the result is a group of consistent components which would make a single efficient automobile.

Meanwhile, from the Sloan Automotive Laboratory, where he is a teaching assistant, Joe M. Rife, '66, described design-oriented seminars (including one for freshmen) in which students are encouraged to develop original ideas in engine design. The results, he said, are an "interesting variety of engines from industrial power plants to high-performance sports car units." Research in the Laboratory includes studies of cycle-to-cycle pressure variation in engines, the development of a flame front in turbulent air, the effect of material properties upon spark plug erosion, and the operation of small-bore, high-speed Diesel engines.

Many of the students and research workers are members of the M.I.T. Sports Car Club, which seemed to Mr. Titus more like "an engineering society" than a hobby club. Its biggest undertakings are biannual "autocross" events at Orange, Mass., and there are also rallies, technical films, lectures, and discussions. Its approach is typified, said Mr. Titus, by the timer its members built for the Orange autocross; it's accurate to .001 second.

The MIT-X is a 100-mile-per hour luxury car for tomorrow's interstate highways designed by M.I.T. students in the Vehicle Dynamics course taught by E. Eugene Larrabee, S.M.'48 (right). The Sloan Laboratory—where Joe M. Rife, '66, is working on a V-8 test engine (left)—is the center of M.I.T.'s interests in automobile engineering. (Rendering: William A. Moore Automotive Arts; photos: Ivan Massar—Black Star; both from *Sports Car Graphic*)

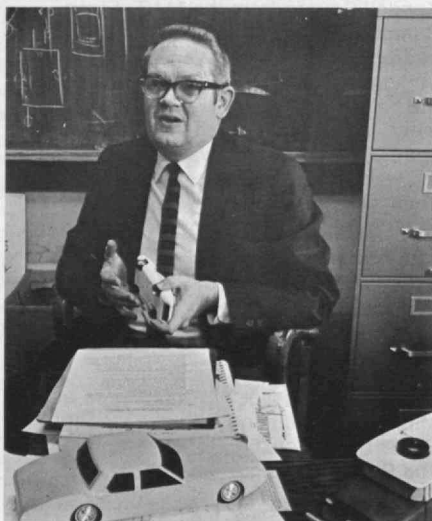


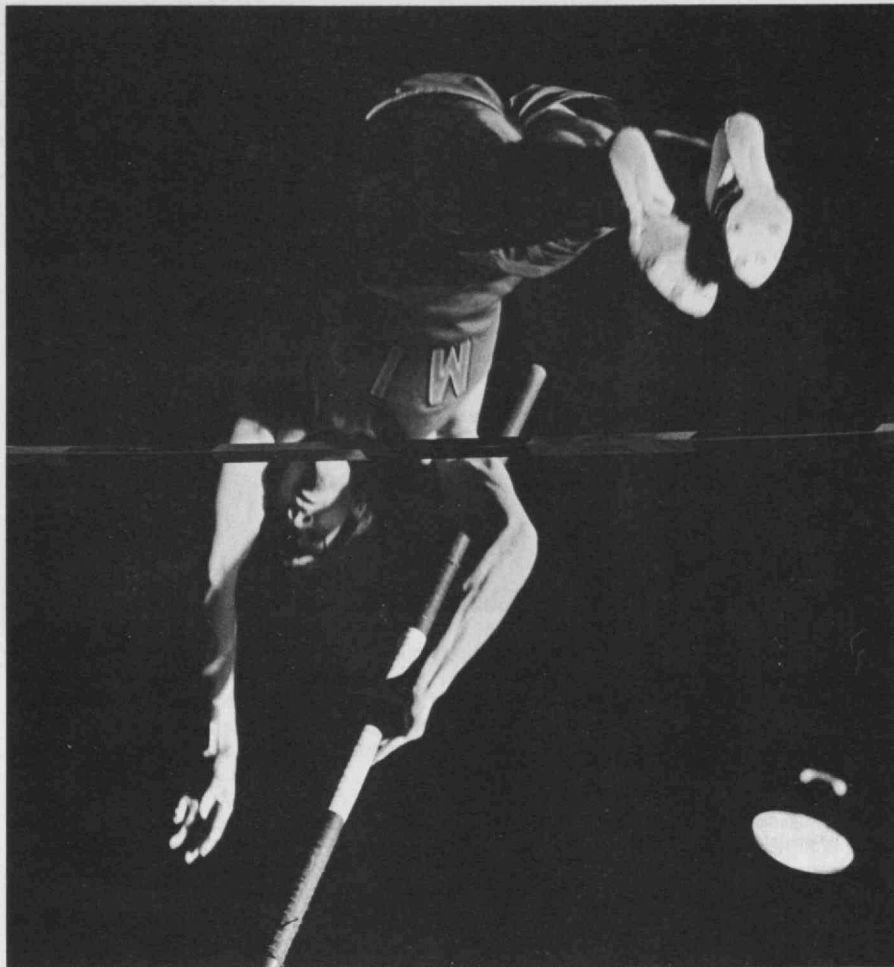
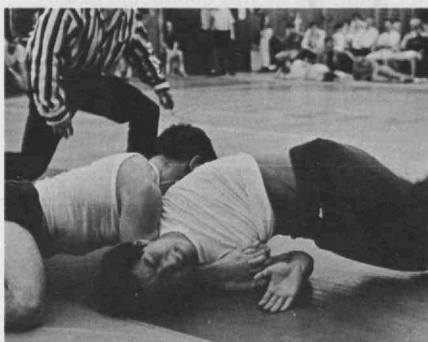
Not Quite the Ugliest

When the balloting was over, Peter Wulkan, '68 (left), was *not* the "ugliest man on campus" after all; the winner was Edward ("Klondike") Krugman, '70. But it was a hot contest: at one cent a vote, Alpha Phi Omega, the national service fraternity, collected \$927.66 to be turned over to the American Cancer Society. Mr. Krugman, the winner, received a trophy, the U.M.O.C. key, and a dinner and movie for two. (Photo: Alan M. Goldberg, '69, from Alpha Phi Omega)

4,000 Shoppers

Some 6,500 Christmas bargains—damaged and overstocked titles of The M.I.T. Press—went on three-day sale in the Sala de Puerto Rico in the M.I.T. Student Center in November, and the community's response left the sales force completely inundated. The official estimate is that more than 4,000 people made the scene (left).





Winter sports highlights: Luis A. Clare, '69, led by half a length in the 200-yard backstroke against Bowdoin; the intramural wrestling title went to Beta Theta Pi when Stephen Bishko, '68, won over Robert N. Takahashi, '69, and earned *The Tech's* praise as the "outstanding wrestler"

in the intramural championships; and Stephen J. Sydoriak, '68, easily cleared 13'6" and later even 14'6" in the pole vault vs. Bowdoin. (Photos: Steven R. Gretter, '71, William A. Ingram, '68, and Timothy W. Finin, '71, from *The Tech*)

Hard to Beat

The last weekend before Christmas vacation goes down as one of the best in history for M.I.T. athletic teams, and it will be a hard record to beat. In basketball against Wheaton and Trinity it was 87-72 and 75-64, for a season record of four wins in six starts. In hockey it was 4-3 over Assumption College when Clayton L. Satow, '68, fired a goal in the last 12 seconds of a sudden-death overtime and brought the season record to 2-2. M.I.T.'s varsity squash team, the best ever, took sixth and seventh straight wins from Seton Hall and Stony Brook. Wrestlers pinned New Hampshire 48-3, track was 70-33 over Columbia and 60-44 over Tufts, the fencers defeated Norwich 18-9, and the swimming team brought its season record to 4-1 by sinking Fordham 55-38. Finally, after 27 years (that's how long pistol has been a varsity sport at M.I.T.), the shooters defeated Navy in a squeaker, 2203-2201.

Starring honors were shared by David G. Jansson, '68, who added 59 points to his basketball record, and Ben T. Wilson, '70, who won both mile (4:27) and

two-mile (9:40.4) indoor races against Columbia.

Most winter sports wind up their seasons in February, a busy month. **Here are** the varsity schedules:

In Cambridge:

Basketball: vs. Coast Guard Feb. 3, vs. Colby Feb. 9; vs. Clark Feb. 10, vs. W.P.I. Feb. 14, vs. Catholic University Feb. 17; and vs. Lowell Tech. Feb. 24. Fencing: vs. Harvard Feb. 7, vs. Brooklyn College Feb. 9, and vs. C.C.N.Y. Feb. 24. Hockey: vs. Wesleyan Feb. 1, vs. Holy Cross Feb. 2, vs. Connecticut Feb. 3, vs. Babson Feb. 7 and 13, vs. Bowdoin Feb. 9, and vs. Amherst Feb. 17. Pistol: vs. Merchant Marine Feb. 24. Squash: vs. Navy Feb. 8. Swimming: vs. Amherst Feb. 7, vs. Brown Feb. 21, and vs. Holy Cross Feb. 24. Track: vs. Connecticut Feb. 24. Wrestling: vs. Tufts Feb. 14, vs. Army Feb. 16.

In New York City:

Basketball: vs. Brooklyn College Jan. 31 and vs. Stevens Institute of Technology Feb. 1.

In Hartford:

Squash: vs. Trinity Feb. 9 and vs. Wesleyan Feb. 24. Swimming: vs. Trinity Feb. 10. Fencing: vs. Trinity Feb. 21.

Hockey: vs. Wesleyan Feb. 22.

In Philadelphia:

Squash: vs. Pennsylvania Feb. 17.

In New Haven:

Squash: vs. Yale Feb. 23.

In Durham:

Track: vs. University of N.H. Feb. 17.

In Amherst:

Wrestling: vs. Amherst Feb. 10.

In Williamstown:

Squash: vs. Williams Feb. 10. Swimming: vs. Williams Feb. 17. Wrestling: vs. Williams Feb. 17.

In Troy, N.Y.:

Wrestling: vs. R.P.I. Feb. 24.

In West Point, N.Y.:

Pistol: vs. Army Feb. 17.

The M.I.T. ski team will participate in Eastern Intercollegiate Ski Association meets at Norwich on Feb. 8-10, the University of Maine Feb. 16-17, and Middlebury, Vt., Feb. 22-24; the track team will run in the Greater Boston Collegiate Athletic Association tournament at Northeastern on Feb. 9-10; the basketball team will be in the Colonial Tournament at Tufts on Feb. 21-22; and the pistol team will be at the sectional National Intercollegiate competition in New London, Conn., Feb. 10.



Republican Senator Howard H. Baker, Jr., who is now serving his first term in Washington after breaking a long Democratic tradition in Tennessee, came to M.I.T. this winter for an informal conversation with students in the East Campus houses. Afterwards he said he found the students' questions "more than ordinarily relevant to the subject" and—though the response was "active and probing," he said, "I did not find the high degree of emotionalism bordering on hysteria which is sometimes the distinguishing characteristic of student groups."

Questions by Undergraduates

Senator Howard H. Baker, a Republican freshman Senator whose election from Tennessee broke precedents a year ago, spent six hours on the M.I.T. campus late in the fall as the guest of undergraduates who live in the East Campus houses. His remarks to more than 100 of them at a seminar in the evening covered several aspects of his Washington activities in search of "modern solutions to old problems."

1. A plan for decentralizing federal authority by returning to local government, with no strings attached, a share of federal tax income; "the federal government collects taxes more efficiently than it spends them," he said.
2. How to add into American welfare programs the "incentive factor needed to lift themselves above poverty and disadvantage."
3. How to accommodate to the technological revolution resulting from automation and nuclear energy, which will give Americans such great new wealth and leisure in the next decade.
4. A plan for an international corporation to build nuclear desalination plants in the Middle East, an effort to use technology to solve the root causes of international tension, "to unlock the equilibrium of belligerence."

The 45-minute discussion period that followed sounded like a probing press conference. Here are some of the

students' questions: In the formula for redistributing federal money to local government, is the amount of redistribution directly or inversely related to the income base of the local area? How would the rebate compare with the present local government tax income? Can the present U.S. foreign policy of supporting stable governments throughout the world actually realize the vision of greater economic achievement? Should the Vietnam war be a factor in American planning for the "coming technological revolution"? Will adequate water supplies really solve the problems between Arab and Israeli? Why should the corporation operating nuclear desalination work better than the corporation which operated the Suez Canal? How can you convince Middle Eastern governments to accept collectivization of agriculture, necessary for success of the desalination plan? Is there real evidence that the plan could be financed? By whom?

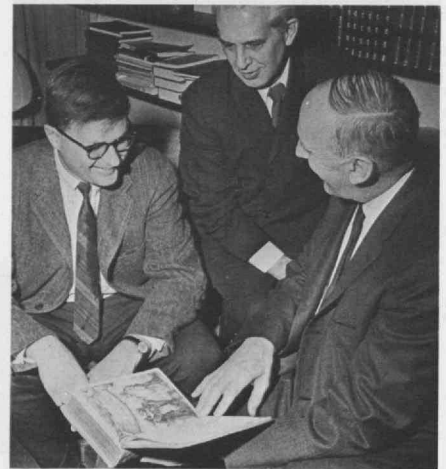
Martin Lecture

The 1968 Minta Martin Lecture will be delivered in Kresge Little Theater by John C. Evvard, Hunsaker Visiting Professor of Aeronautical Engineering, who is Associate Director for Research of N.A.S.A.'s Lewis Flight Propulsion Center, on February 27 at 8 p.m. Dr. Evvard's topic will be "A Philosophy of Re-examination," and his lecture will be open to the public.

Associate Dean of Management

Abraham J. Siegel, a specialist in labor relations and collective bargaining who has been a member of the teaching staff since 1954, has been appointed Associate Dean of the M.I.T. Sloan School of Management. He succeeds John M. Wynne, S.M.'56, who has become Vice President—Organization Systems for the Institute. Dr. Siegel holds a dual appointment as Professor of Industrial Relations in the Sloan School and in the Department of Economics of the School of Humanities and Social Science; he has directed the Sloan School's graduate studies programs since August, 1967, and he will continue to hold this responsibility as Associate Dean.

Dr. Siegel came to M.I.T. as an instructor following study at City College of New York, Columbia University and the University of California (Berkeley). In Cambridge he has conducted extensive research on management-labor relations, industrial conflict, collective bargaining and human relations, and he has frequently served as a consultant to labor unions, industrial organizations and government in these areas.



Galileo Comes to M.I.T.

Arthur E. Vershbow, '43 (left, above), Executive Engineer of the Modern Die and Machine Company of Boston, has given an exceptional copy of Galileo's *Dialogue of the Two World Systems*, published in 1632, to the M.I.T. Libraries. Unlike most copies of the edition—all are rare—this book has its original frontispiece, an etching of Aristotle, Copernicus and Ptolemy, still intact; the frontispiece is usually missing, according to William N. Locke (right), Director of Libraries at M.I.T., because most previous owners apparently used it as a wall decoration. Robert O. Preusser (center), Associate Professor of Visual Design in the M.I.T. Department of Architecture, is Chairman of the Faculty Advisory Committee on the Libraries.



At the Head of the Charles

With over 450 oarsmen from 40 colleges, schools, and clubs participating, the 1967 Head of the Charles Regatta was the largest single-day rowing event ever staged in North American waters. M.I.T. entries won first in the junior four-oared shells with cox, third in the junior eights, first and second in the lightweight eights, fourth in the senior fours with cox, and seventh and tenth in the senior eights—enough to edge out Philadelphia's Vesper Boat Club for the day's high score. The picture shows D'Arcy G. MacMahon (left) of the Cambridge Boat Club presenting the regatta trophy to Jack H. Frailey, '44 (center), crew coach, and Joel P. Robinson, '68, varsity captain. (Photo: Frank Cushing from the Boston *Herald-Traveler*)



A. J. Siegel



H. H. Woodson, '51

Sporn Professorship

Electric utility and power companies throughout the U.S. have joined to fund the Philip Sporn Professorship of Energy Processing at M.I.T., and Herbert H. Woodson, '51, of the Departments of Electrical and Mechanical Engineering has been appointed to the new post.

President Howard W. Johnson, announcing the 10-year funding of the Sporn Professorship, paid tribute to Mr. Sporn's engineering and administrative contributions, spanning more than half a century, which have "provided the basis for many of the major technological advances in the industry."

Professor Woodson's field of specialization is electromechanical energy conversion and control. He first came to M.I.T. in 1947 after four years' service in the U.S. Navy, and he has been in Cambridge ever since, except for two years' work at the Naval Ordnance Laboratory in Silver Spring, Md. Professor Woodson has been a member of

the faculty since receiving his Sc.D. in 1956.

Mr. Sporn, whom the professorship honors, is a pioneering utility executive who has been a leader in the advancement of nuclear power. He has been with the American Electric Power Company and its predecessor companies since 1920—as President from 1947 to 1961 and since then as Chairman of its System Development Committee to study the company's engineering and technological activities. Mr. Sporn is a member of the Visiting Committee on the M.I.T. Department of Electrical Engineering and this fall honored the Institute by delivering four lectures on "Technology, Engineering, and Economics," which are to be published by The M.I.T. Press.

Assistant Provost

Paul E. Gray, '54, who has been a member of the M.I.T. staff in electrical engineering since 1957, Chairman of the Freshman Advisory Council since 1964, and Associate Dean of Student Affairs since 1965, is now Assistant Provost of M.I.T. In the new position of assistant to Jerome B. Wiesner, Provost, Dr. Gray will be responsible "for co-ordination and development of the undergraduate curriculum, for helping augment the opportunities available to students, and—particularly—for ensuring that the first-year program remains coherent within the growing range of options provided by nearly every department at the Institute and by the addition of such new programs as the major in liberal arts," in Dr. Wiesner's words.

Dr. Gray is considered an authority on the physical electronics and modeling of semiconductor devices. He studied at M.I.T. from 1950 to 1960 for S.B., S.M., and Sc.D. degrees and joined the faculty upon completion of his doctorate. As a member of the Dean of Student Affairs staff, Dr. Gray has become known as a champion of undergraduate education at M.I.T. and a staunch supporter of the developing programs for increasing the elective opportunities and faculty guidance available to first-year students. In his new assignment, Dr. Gray will continue this interest with responsibilities for "studies aimed at examining and improving teaching methods and facilities for undergraduate instruction," Dr. Wiesner said, and he will provide support for faculty with these interests.



Paul E. Gray, '54



J. C. R. Licklider

Licklider Appointed

Joseph C. R. Licklider, a psychologist whose research has brought him recognition as an authority on human interaction with computer systems and data banks, has rejoined the M.I.T. Faculty as Professor of Electrical Engineering; from 1950 to 1957 he was Associate Professor of Psychology of Communications in Electrical Engineering and of Psychology in the Department of Economics. In his new assignment, Dr. Licklider will be associated with M.I.T.'s Project MAC, a research center on time-shared computer systems and on new ways for people to use such systems as aids in problem-solving and decision-making.

Dr. Licklider studied at Washington University and the University of Rochester; after his first M.I.T. assignment he was associated with Bolt, Beranek and Newman, Inc., of Cambridge, served as Director for Behavioral Sciences and Information Processing Research of the Advanced Research Projects Agency in Washington, and was consultant to the International Business Machines Corporation. Last year, as Visiting Professor of Electrical Engineering at M.I.T., he worked with Project Intrex and its program of experiments in scientific and technical information transfer. In other assignments, Dr. Licklider has applied his background in psychology to acoustics communications and communications theory, and information storage and retrieval.

Mrs. Stanley McCormick, 1875-1967

Mrs. Katharine Dexter McCormick, '04, who has done more than any other person to make co-education a reality at M.I.T., died in Boston on December 28, 1967. Her announced benefactions to the Institute total just under \$2 million, given for construction of the first on-campus women's residence which now bears her name; but her influence on the role of women at the Institute has been pervasive. She was, for example, for many years the contributor of a famous "taxi fund" to help co-eds living in the dormitory on Bay State Road in Boston reach Cambridge classes on inclement days.

Shortly after Mrs. McCormick's death it was announced in Santa Barbara, Calif., that M.I.T. was to be a major beneficiary of her estate, estimated to total \$30 million. Complete details await the official probate of Mrs. McCormick's will.

Mrs. McCormick, who studied biology at M.I.T., was prominent in the women suffrage movement, a founding officer of the League of Women Voters, and an early worker in behalf of birth control clinics and research. Stanley R. McCormick, her husband, was the youngest son of Cyrus McCormick, inventor of the reaper; he died in 1947.

A former White House assistant, now Visiting Professor in the Department of Political Science at M.I.T., discusses a middle ground between war and withdrawal.

Viewpoint on Vietnam

To attend Viewpoint, pick up your lunch in the Lobdell Room of the Student Center and take it to the adjacent lounge for an informal conversation with a faculty expert. One Tuesday this fall the topic was "Vietnam and Its Impact on the Future of American Foreign Policy," and the speaker was Richard N. Goodwin, Visiting Professor of Public Affairs. The following is an edited transcription of Professor Goodwin's extemporaneous introductory remarks and of his responses to a number of student questions.

Professor Goodwin first went to Washington as a law clerk for the former Supreme Court Justice Felix Frankfurter. He joined the staff of Senator John F. Kennedy in 1959, was named Assistant Special Counsel to President Kennedy in 1961, where he concentrated on Latin American affairs and civil rights, and was appointed Deputy Assistant Secretary of State for Inter-American affairs in 1962. A year later he was Secretary-General of the International Secretariat of the Peace Corps, and in early 1964 he became Special Assistant to President Johnson, a post which he gave up in the fall of 1965 to accept a fellowship at Wesleyan University's Center for Advanced Studies.

I am now a dissenter on the Vietnamese war, a so-called moderate dissenter, who believes that in the judgment of history Vietnam may well be regarded as the single greatest blunder in American history. The only thing remotely comparable is the conquest of the Philippines, which in a very strange way opened the way to the Vietnamese war since it was the beginning of U.S. power in the Pacific. But Vietnam is different; it has taken place over a much longer period of time, is compounded much more gravely of human folly, and is much more expensive in terms of life and resources. Also, we are now a great world power and our acts have meaning and implications far beyond our own shores.

Any effort seriously to review the possible consequences of the Vietnamese war must take into account the very real possibility that it will escalate to a much larger conflict, which of course changes the entire equation. That possibility seems to me a very likely thing; the possibility of involving China and ultimately the Soviet Union in a real confrontation over the next few years is very high. But if that does not happen the war will have to end through some form of negotiation or withdrawal, and the question is, what, under these circumstances, would the Vietnamese war have accomplished?

The answer, of course, involves prophecy of the consequences of alternatives which you can never realize. Ultimate questions of this kind are almost never even discussed in government because to answer them you have to say what will happen over the next 30 or 40 years if you do or do not take certain present actions, and this is impossible. We have no way to make this kind of historical prophecy, for this is just too complicated an enterprise. You cannot feed the factors into a computer because you don't even know what are the relevant factors. So you must understand that everything I say about the situation after Vietnam is subject to the immense qualification that it is based on some knowledge but mostly on intuition.

The Erosion of Internationalism

The short-range results are not so hard to foresee. The rationale for the war—

greatly oversimplified—is to demonstrate that America keeps its commitments abroad and that we cannot be defeated by communist power. The ironic thing is that the war is proving exactly the opposite of these two premises. Around the world, people are seeing that the most powerful country in the world is unable to bring the war to a successful conclusion. If you were a Soviet revolutionary and you wanted to tear down the United States you couldn't have thought of a better scenario than the Vietnamese war, which has succeeded in diminishing U.S. influence around the world; taken U.S. attention away from the Middle East, Africa, South America; and used up our resources so that it is impossible for us to meet our domestic problems. For example, a few months ago the U.S. sent three planes to the Congo to help a government that was under attack by some white mercenaries. Two or three years ago such a move would not even have been noticed in the newspapers—a routine extension of some minor assistance to a black government under white attack. But there was a tremendous outcry in the Senate of the United States about making commitments without consulting Congress; and the help had to be withdrawn very quickly. Our difficulties with foreign commitments are obvious in the debate on the foreign aid bill in which the amount of assistance has been cut and crippling amendments have been added. The original commitments to aid underdeveloped countries are being eroded. Growing moves toward a series of protectionist tariffs are another example. The fact is that the shock of the Vietnamese war to our country is causing a natural withdrawal from the world; people are becoming disgusted, discouraged, and skeptical of our involvement in overseas enterprises, even those which are truly important to our interests and important to the interests of other people. Even among conservatives—or maybe especially among conservatives—the Vietnam war is causing a kind of rebirth of isolationism. Even liberals are beginning to support Senator Fulbright in his efforts to restrict the power of the President to make commitments overseas; these are people who 10 years ago were violently opposed to the Bricker amendment which had essentially the same goal.



Confrontation between lunching students and Richard N. Goodwin, Visiting Professor of Public Affairs at M.I.T., at a Tuesday session of Viewpoint in the Student Center. Professor Goodwin, formerly a White House Assistant under Presidents Kennedy and Johnson, spoke on Vietnam, which "in the judgment of history may well be regarded as the single greatest blunder in American history." But, he said, "I think it is reprehensible for people who are too old for the draft to organize young men to violate the draft and go to jail."

On the other hand, it is also true, of course, that the Vietnamese war has made the rest of Southeast Asia more secure. Thailand, Laos, and Cambodia would have more serious problems today had South Vietnam fallen to North Vietnam, and at least Thailand and Laos would surely oppose any withdrawal of the U.S. today. This does not, of course, answer the question of whether we should withdraw because their opposition is an expression of their interest and not necessarily our own.

The Importance of Political Power

The long-range impact of Vietnam is much more difficult to anticipate. Assuming the war reaches some sort of satisfactory solution without leading to the ultimate confrontation, I think we will have learned in a sense a lesson opposite to that which we learned in Korea. In Korea we saw the importance of military force. It was Korea after all that really triggered the N.A.T.O. alliance. It was Korea that persuaded people that there was a real military threat in the world that had to be met, and it led directly to the buildup of our own defense and to the formation of our alliance systems in Western Europe. Vietnam will mark a similar turning point, but it will show that in the kind of world in which we now live, military power is of secondary importance, essential in certain situations but secondary to political power. I think we are likely to think less of using military force as a solution to problems, and more of achieving our ends through political identifications—through identifying the U.S. with the real insurgent elements in the world, for example, which are essentially the popular elements in the underdeveloped countries. The desires for economic development, for some form of political expression if not political liberty, for some sort of national dignity, will become not merely catchwords but actually a motivating factor in our policy—not simply out of idealism but out of a lesson learned in Vietnam that this is the only way in which we can hope to maintain a world community of states which is not hostile to our interests and which has some prospect for the future.

The second consequence will be to open up relations with China. The Vietnamese war has made China loom large—too

large, in terms of the realities—in the American consciousness. We will have to anticipate some realistic and very serious dealings or confrontations with China, and the pressures after Vietnam will be not to become friends or allies, but to try to open up relationships through which we can at least keep informed about each other's societies. This will happen just as the pressure to begin negotiations with Russia came even at the height of the Cold War, five years ago.

The most important consequence of the end of the Vietnamese war—assuming even moderately intelligent leadership on the part of the U.S.—will be a real explosion of the Soviet-American *détente* and the final end of the Cold War between Russia and the U.S. In most parts of the world the interests of the U.S. and the Soviet Union are the same; the loss of the ideological revolutionary drive in the Soviet Union—not completely, but for all practical purposes—has made it clear that the U.S. and U.S.S.R. are the two countries in the world with the greatest interest in maintaining the territorial *status quo* and in diminishing the arms race. The test ban treaty was only the first step in what I think could have been a very fast-moving series of agreements between the U.S. and the Soviet Union had not the Vietnam war made further progress impossible. Progress was impossible because as the titular head of the world revolutionary movement—if not the actual head and certainly not the active head—the Russians find it impossible to deal on a very intimate basis with the U.S. while we are fighting another socialist country. If only in relation to China, they must avoid a posture which could be viewed as a sell-out by them of the revolutionary movements in Asia.

Russia today would be delighted to see the Vietnam war end, and it's completely irrelevant to them who wins and who takes over South Vietnam; they want it to end because they think it's dangerous, which it is.

When the Vietnam war is over, no matter on what terms, there are going to be a lot of problems in Asia; there are

going to be more guerrilla wars; the possibility will increase of some expansive moves by China once she can hold some American cities hostage to I.C.B.M.'s. There will be some continuing conflict in Asia, and we will be involved in some way—hopefully much more intelligently than in Vietnam now.

Q: If we give in to North Vietnam, would not our prestige be lowered throughout the world?

That depends on what you mean by "give in" and how you do it. I oppose withdrawal. It is safe to assume there are a number of people in South Vietnam who do not want to be run by Hanoi, and there are a great number of people there who don't want the Communists to take over. What we have succeeded in doing by the sheer weight of our presence is virtually to destroy South Vietnamese society. You can perhaps speculate whether the Viet Cong would have taken over had we never gone in but you know that now, because we did go in, there is no viable alternative. While we have encouraged the military buildup in the north, we have torn away the fabric of society in the South; nobody runs the country today except the U.S. military. Having done this to the country—having destroyed any hopes of resistance or compromise—we cannot pull out and just leave them all to their fate. A withdrawal might have other repercussions: everybody in Asia would have to take an immediate second look at their relationships and begin to think of coming to terms with the Communists. For after all, in a military sense there is only one country that can protect any Asian country. The day the Chinese went over the border of India, that day the Indians who were neutral were in Washington pleading for help because they had no other place to go.

What you want is a way to "give in" that does not constitute defeat, so you want some sort of political compromise which will leave the future in the hands of the South Vietnam people, some of whom are Communist and some of whom are not. Then if the country turns to Communism it will be an

internal political decision, not an American defeat and surrender. And South Vietnam under these conditions might not turn to Communism.

Q: What might have happened in Vietnam had President Kennedy lived?

You don't know what President Kennedy would have done. I regard what President Kennedy did—the buildup from 500 to 16,000 advisers—as a mistake, and I think in retrospect he might, too. There were a lot of reasons for doing that, including I think the misjudgments of key officials who said that all you need to do is put in a few thousand more men and the thing will all be under control. Remember, too, that Vietnam was then a very peripheral problem. Our attention was focused almost entirely on the confrontation with the Soviet Union and the *détente* with Russia was Kennedy's great contribution to foreign policy. In his Vietnam policy President Kennedy was careful to maintain that our forces were advisers, not combatants. It was the Vietnamese's war; we did not send combat troops; our forces were forbidden to fire except in self-defense; they were all attached to South Vietnamese units; President Kennedy did reject proposals for bombing and for the use of combat troops because he did not want to make it an American war. The decision to give Americans a combat role was made in 1965 by Johnson; and no one can say whether Kennedy would then have made that decision. He was certainly aware of the dangers of making it an American war because he spoke about it many times.

Q: What about the relationship of the Vietnamese war and some of our major internal problems and policies? If we elect to withdraw, would our national frustrations be taken out in anti-Negro sentiment?

It seems to me clear that the Vietnamese war is a demoralizing influence on America. It is tainting our entire society—the feeling about it, the presence of violence, the lack of any confidence in the moral structure and determination of our government. I think these things infuse the entire society with fear and with apprehension, with distrust of government, with distrust of the political process, with distrust of leadership; and I think this in turn is helping to create the enormous growth of anti-Negro sentiment in the past year in this country. It isn't just the riots; it's all part of this process I think of as some kind of moral deterioration. I do believe Vietnam has a lot to do with this process, partly because of the impression that Vietnam gives of the kind of leadership we have in the country.

I think the end of the war would have a liberating effect rather than the other way around. I doubt that Americans would feel frustrated because they didn't win; indeed, I think most Americans would like to get out of Vietnam, one way or another. And two years after

we get out I think most Americans would remember it only as vaguely as we now remember the countries of Korea, or Cuba.

Q: Whenever I've talked about Vietnam, I've come up to the question: Is this a civil war or a war controlled by Hanoi?

Whatever it was in the beginning, obviously this war is both now. There is no doubt that there are indigenous leaders of the National Liberation Front in the south and that a lot of the Viet Cong enemy are southerners recruited from the villages, so there is in this sense a civil war. In addition, there are 40,000 or more North Vietnam regular army soldiers fighting, and the Viet Cong has a lot of equipment from Hanoi. In the same way, there's no doubt on our side that the resistance is both indigenous and American-supported. North Vietnam is involved in this as much as we are; I think they would give very little support if they didn't have to.

Q: Does Hanoi control the National Liberation Front?

In a sense the question is irrelevant for the ultimate settlement, because unless Hanoi and the National Liberation Front are agreed there will be no negotiations. The only effective negotiations you can have are with all of the forces marshaled against you represented and in agreement. Now whether that's Hanoi with an N.L.F. puppet or Hanoi and an N.L.F. equal is an interesting question, but I don't think it's necessary to know the answer with any certainty.

Q: If we have feelings against the war in Vietnam, what is the best way to express them? I am graduating this year; what should I do about the draft?

You cannot change the course of American policy by anything you do in a direct, immediate way; anyone looking for that is looking for the impossible. But dissent—the speeches, the marches, the protest, the talk—has had a big impact in this country; the country's opinion is changing, and dissent is one reason. The dissent has helped raise the issue, keeping it constantly in the public mind; even the more extreme dissent, with which I don't agree has in a sense made it easier for the more established, respectable types to dissent. If there wasn't large-scale dissent there wouldn't be many senators getting up and making speeches. As 1968 comes on, the most effective way to work against the war is political work, to get behind a candidate—whether Senator, Congressman, or President—who presents a realistic alternative to our present Vietnamese policy. Giving up time and involving yourself in political work over the next year would be the most effective thing that you could do. It can be much harder than the single act of protest, for the protest takes only a few minutes; but real political action requires that you give up several months of your time, salary, and job.

Refusing to be drafted and going to jail is a substantial personal protest and I respect any man with the courage to risk imprisonment for his convictions. It's not effective as dissent simply because not enough people will do it, but it can be an individual moral act of great significance. This is not the kind of protest that I would make myself. My own feeling is that military service is one of the taxes of citizenship unless you're a pacifist by religious conviction. I think the fact that you are a citizen means that you have agreed to accept a few disagreeable burdens, and this is one of the very few. Of course, you can give up your citizenship. One thing I do not like: I think it is reprehensible for people who are too old for the draft to organize young men to violate the draft and go to jail. These people have a lot of ways of going to jail themselves, if they want to protest.

Q: Could you say something about the various formulas for actually ending the Vietnamese war?

There are real indigenous political forces in South Vietnam. But these people have no chance to run things now because we are running the country and we want to have leaders there who go along with us running the war our way. The indigenous political forces, though weakened by our presence, still have some appeal to the South Vietnamese. What we should seek is a situation in Vietnam where the future is left to the balance of internal political forces without any outside military force.

The situation is such that if we withdraw now a large army will march in and take over by force. The kind of settlement the National Liberation Front is proposing and I am talking about is one in which there would be a withdrawal of foreign forces, a dismantling of the war, followed by some kind of an interim structure which would guarantee to both sides that elections would be held and that those who win them would be allowed to assume power; perhaps even some kind of international trusteeship or force. I think with this kind of plan in effect you would see that the National Liberation Front is not monolithic; there would be whole sets of realignments which are unpredictable, and therefore the outcome is unpredictable. We don't know much about it, and we must accept those risks.

Individuals Noteworthy

Captain **Jerome H. King, Jr., S.M.'51**, has been selected by the Navy and nominated by President Lyndon B. Johnson for promotion to the rank of Rear Admiral. **Robert H. Lucas, S.M.'51**, is now General Manager in charge of Lake Shipping for the Great Lakes Fleet, U.S. Steel's combined Pittsburgh and Bradley Fleets. Prominent for their contributions to science and technology, two newly appointed members of the U.S. Department of Commerce Technical Advisory Board are **David V. Ragone, '51**, and **Edward B. Roberts, '57**. Reappointed are **Richard T. Kropf, '31**, **Richard S. Morse, '33**, **Richard S. Leghorn, '39**, and **Courtland D. Perkins, S.M.'41**. Dr. Ragone also has been appointed as Professor in the Department of Metallurgy and Materials Science, Carnegie-Mellon University.

Thomas P. Cheatham, Jr., Sc.D.'52, has been elected to the new office of Vice President—Systems and Research, Grumman Aircraft Engineering Corporation (Bethpage, L.I.). **John F. Jacobs, S.M.'52**, is now Vice President—Bedford Operations of The MITRE Corporation. **Victor J. Mizel, '52**, is now Professor in the Department of Mathematics, Carnegie Institute of Technology. **Daniel F. Fairbanks, Sc.D.'53**, formerly Assistant Professor of Chemical Engineering at M.I.T., is now Director of Research and Development, Supercon Division of Norton Company's subsidiary, National Research Corporation.

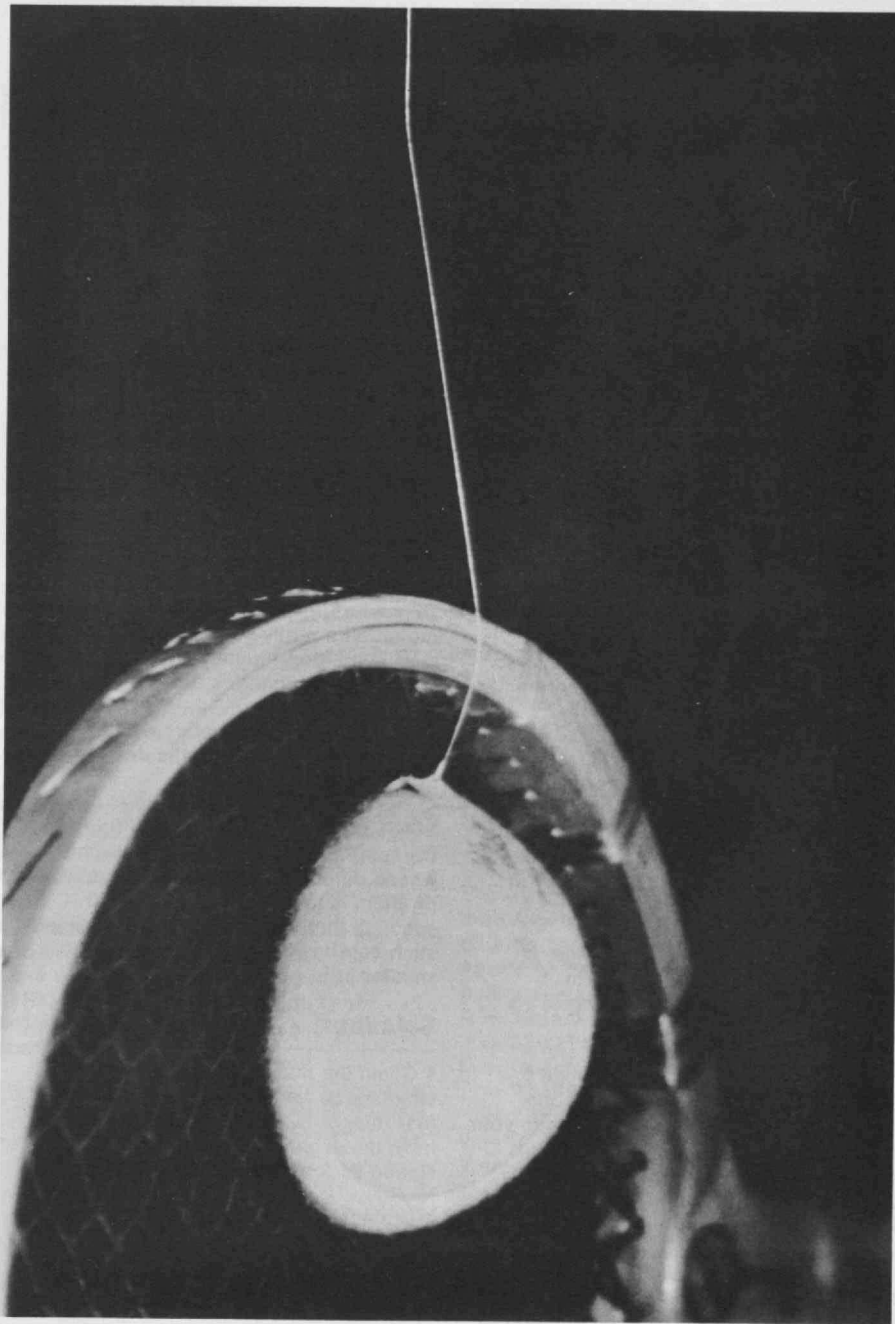
Otis C. Ferrell, S.M.'53, is Vice President of Perkin-Elmer Corporation. **Michael S. Ariens, '54**, is now Executive Vice President of Ariens, a Wisconsin located company. **Arnold H. Berger, S.M.'54**, has become Associate Director of the Cleveland Commission on Higher Education, an agency which fosters coordination among colleges in the county. **Harold N. Bogart, S.M.'54**, of the Ford Motor Company, is now Vice President of the American Society for Testing and Materials.

Philip E. Hugin, S.M.'54, is now a Director and Executive Vice President—Corporate Staff of the Western Electric Company. **John E. Preschlack, '54**, has been elected Principal, McKinsey and Company, Inc., international management consultants. **William S. Wheeler, S.M.'54**, is now Vice President and General Manager of the Eastern Division, Sylvania Electronic Systems. **Philip K. Baltzer, S.M.'55**, will direct Laboratories RCA, Inc., a research center in magnetic materials, semiconductors and semimetals, plasma physics, and communications theory now being developed near Tokyo, Japan, by Radio Corporation of America.

Warren G. Bennis, Ph.D.'55, formerly Professor of Management and Organizational Psychology and Chairman of the Organization Studies Group at M.I.T., is Provost of the Faculty of Social Sciences and Administration at the Buffalo University Center.

Strobe Probe

Harold E. Edgerton, Sc.D.'31



Mystery Photograph

A tennis ball on a string is hit by a tennis racket. Explain the form of the string! Can this phenomenon be used?

Hi. I have been toying with an idea for a rather unusual column for later this year—one in which all the problems would somehow relate to a common theme. Since, according to my girl friend, I live, eat and breathe football, the choice for the common theme is obvious. Hence I would appreciate receiving any football-based problems which you can think of. Although all problems are still welcome, I would prefer that, if possible, you rewrite them in football terms. I realize that girls (except for Tech co-eds, of course) may find this confusing, but maybe next year we'll run one on sewing to even things up.

Now for this month's problems:

Problems

The first three problems (a new record) come from Richard J. Grant, '65:

15 The following example always comes up in elementary number theory: The rationals in $[0, 1]$ have measure zero because if we order them like $(0, 1/2, 1/3, 2/3, 1/4, 3/4, 1/5, 2/5, 3/5, \dots, 1/n, 2/n, \dots, (n-1)/n, 1/(n+1), \dots)$ we can cover them with open intervals of length $e, (1/2)e, \dots, (1/2^n)e$, so measure of cover is $\leq 2e$. The problem is: Suppose $e = 1/10$; then the covering has length $\leq 1/5$. Exhibit a real number in $[0, 1]$ which is not covered.

16 Show that every positive integer n divides some number of the form $111 \dots 1100 \dots 00$, i.e., a string of 1's followed by a string of 0's.

17 This one isn't original but doesn't seem as well known as it should be and certainly is more interesting than your topology homework: Show that the intersections of the trisectors of the angles of any triangle form an equilateral triangle.

18 One of my colleagues at Brandeis, Michael R. Gabel, '65, submits the following problem which is an offshoot of some of his work on number theory: Let a be an integer greater than 1. Prove that there exist integers x, y : $1 < x < (2a - 1)$, $1 < y < (2a - 1)$ such that $xy \equiv 2a - 1 \pmod{2a}$ if and only if $a > 3$.

19 Last year John A. Maynard, '46, submitted the coconut problem (see Technology Review June, 1967, p. 6). George H. Ropes, '33, has generalized it to read: N natives gather coconuts. The first native secretly divides the coconuts into N equal piles and has one coconut left over which he discards. He takes one pile and pushes the rest of the coconuts back into one big pile. Native number two does the same with the remaining coconuts, discarding one coconut and taking one pile. This continues through native N . When the last native is through, the number of coconuts left is divisible by N . How many coconuts were gathered in the beginning?

Speed Department

SD5 One of my old friends from Baker House, Chester L. Sandberg, Jr., '67, one of the cool guys in the world, submitted a really sharp problem which he read in a Litton Industries ad in *Aviation Week*: Form a limerick out of $(12 + 144 + 20 + 3\sqrt{4}) / 7 + 5(11) = 9^2 + 0$. This is so sharp that I plan to print his solution in three months despite precedents.

SD6 The last problem is from "(Lin)" Derman: A "prime pair" is two primes whose difference is 2, e.g., 17 and 19. The problem is to prove in less than 30 seconds that the number between any such pair has factor 6, for pairs with smaller prime greater than 6.

Solutions

1 Given the number N , composed of 10 integers, find the number N' , where the first integer is the number of zeros in N , the second is the number of 1's in N , and so forth up to nine, such that $N = N'$.

I received the following aesthetic masterpiece—beautifully typed—from Edward P. DeLorenzo:

The answer 6,210,001,000 can be shown, by a process of elimination, to be the unique solution. Call the position which describes the number of times the digit n appears the n th position; a number whose digits add to more than 10

is said to be in an overflow condition.

1. The sum of all the digits must equal 10, since these same digits describe the numerical breakdown of the 10 digits.

2. No position can have a 9 because: a. a 9 in the zero position implies a 0 in the nine position; and b. a 9 in any other position implies overflow.

3. No position can have an 8 because: a. an 8 in the zero position implies a 0 in the one position and a 1 in the eight position; and b. an 8 in any other position implies overflow.

4. No position can have a 7 because: a. a 7 in the zero position implies a 1 in the seven position, a 0 in the two position, and a 1 or a 2 in the one position; and b. a 7 in any other position implies overflow.

5. There must be at least a 3 in the zero position since the seven, eight, and nine positions must have 0's.

6. The largest digit possible in the one position is a 2: a. a 3 in the one position yields a sum of nine and the 2 required in the three position implies overflow; b. 4 and 5 imply overflow; and c. 6 is impossible.

7. Neither the two nor three position can have a number larger than 3: a. 4 and 5 imply overflow; and b. 6 is impossible.

8. The four, five, and six positions are limited to the digits 0 or 1; any larger digit can be shown to imply overflow.

9. There must be a 6 in the zero position: a. a 3 implies 0's in four, five, and six, which is a contradiction; b. a 4 implies 0's in five and six, also a contradiction; c. a 5 implies 0's in positions four, six, seven, eight, and nine and a 1 in the five position which implies a 2 in the one position. This leaves the two and three positions to be filled: the sum of the digits in two and three must be two; neither can have a 0 since all five 0's are accounted for (this implies neither can have a 2 or a 3); and finally a 1 in each of these positions implies a contradiction.

10. There must be a 1 in the six position and 0's in positions four, five, seven, eight and nine.

11. The remaining 0 is in the three position; a non-zero digit in the three position implies a 3 in either position one or two, both of which are impossible.

12. There is a 2 in the one position; 0 or 1 implies a contradiction.

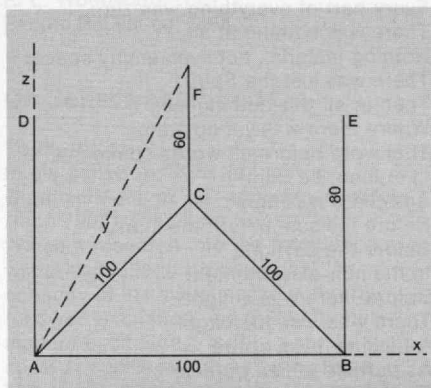
13. There must be a 1 in the two position for the sum of the digits to equal 10.
 14. The steps to this point show that if a number exists which satisfies the conditions it must be 6,210,001,000. An examination of the number shows that it in fact does satisfy the conditions.

Also solved by Mark H. Yu, '70, Douglas J. Hoylman, '64, Peter E. Lobban, '66, Eric Rosenthal, E. Alan Phillips, '57, John L. Joseph, '40, Beverly Seavey, and Abba M. Krieger, '69.

2 A flat triangular field, 100 feet per side, has 60-, 80-, and 100-foot-high flag poles at the respective corners. Determine the length and base location for a step ladder that can be rotated and just touch the top of each flag pole.

Mr. Lobban sent in the following solution:

The problem bows to analytical geometry. Let the triangle be placed in the x,y plane of a three-dimensional coordinate system as shown, with AD || BE || CF || z-axis.



The coordinates are as follows:

A: (0,0,0)
 B: (100,0,0)
 C: (50, 50√3, 0)
 D: (0,0,100) top of 100' ladder
 E: (100,0,80) top of 80' ladder
 F: (50, 50√3, 60) top of 60' ladder

The problem is to find a point O = (x,y,z) such that OD = OE = OF and O is in the plane of the triangle. Clearly z = 0 because of this latter condition. Then $(x-0)^2 + (y-0)^2 + (0-100)^2 = (x-100)^2 + (y-0)^2 + (-80)^2$, for OD = OE implies OD² = OE².

Similarly, $(x-100)^2 + (y-0)^2 + (-80)^2 = (x-50)^2 + (y-50\sqrt{3})^2 + (-60)^2$. The first of these equations reduces to $x^2 + y^2 + 100^2 = x^2 - 200x + 100^2 + y^2 + 6400$, whence $200x = 6400$ or $x = 32$. Plugging this into the second gives $68^2 + y^2 + 80^2 = 18^2 + y^2 - 100\sqrt{3}y + 7500 + 3600$ or $100\sqrt{3}y = 400$ and $y = (4\sqrt{3})/3$.

The length of the ladder is, of course, OD or OE or OF = $\sqrt{x^2 + y^2 + 100^2} = \sqrt{10000 + 1024 + 16/3} = 8/3 (\sqrt{1551})$.

Also solved by Mr. Rosenthal, Mr Yu, Mr. Hoylman, Norman M. Wickstrand, '29, John E. Prussing, '62, Jeffrey Robinson (from John W. McNear, '59), F. Wade Greer, Jr., '52, and Douglas K. Severn, '23.

3 The problem:

♠ A 7 3 2
 ♥ A 7 2
 ♦ J 9 5
 ♣ A K 10

♠ K J 9 6 4
 ♥ K J 8 6 5
 ♦ 7 2
 ♣ 5

♠ Q 8 5
 ♥ Q 9 4 3
 ♦ —
 ♣ Q J 9 6 3 2

♠ 10
 ♥ 10
 ♦ A K Q 10 8 6 4 3
 ♣ 8 7 4

Contract: seven diamonds by South;
 opening lead: club five.

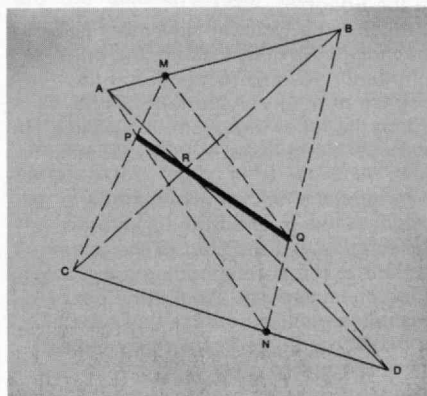
I received the following letter from Warren Himmelberger:

A squeeze is needed to develop the 13th trick. The best chance is to find East with no more than three spades so that the ♠7 can be used to squeeze West. After this bit of analysis, the hand plays easily.

Take the opening lead with the ♣A. Play two rounds of trumps and lead a club to ♣K. Play the ♠A and ruff a spade. Lead a low trump to dummy's ♦J and ruff a third spade. Play two more trumps, discarding dummy's ♣10 and ♥2. South then leads his last trump, squeezing West. If West drops his ♠K, dummy's ♠7 is good. So West discards the ♥J. Now dummy discards the ♠7 and East is squeezed. If East discards his ♣J, South's ♣4 will be good. East throws the ♥9. A heart to dummy's ♥A drops the ♥K and ♥Q, and the ♥7 takes the 13th trick.

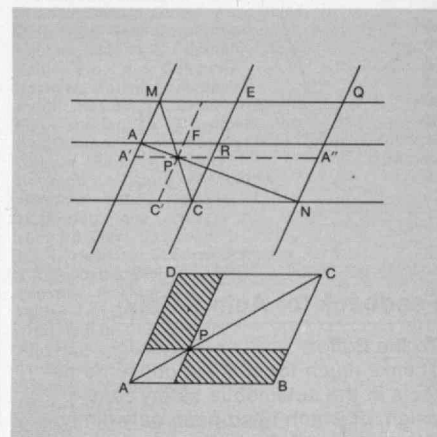
Also solved by Mr. Severn, Allen L. Zaklad, '65, George J. Marlowe, Sc.D.'50, Alvan L. Davis, '98, Charles D. Coltharp, '58, and Victor M. Harlick.

4 Given any two segments AB and CD and M is any point on AB and N is any point on CD, show that intersection P of MC with AN and intersection Q of MD and NB and R, the intersection of AD and BC, are colinear.



Mr. Yu submitted the following solution:

This problem may be handled by projective geometry. Let the projective point source be on the same level as the line BD. We have then, using the same letters as in the original diagram:



For convenience, other points on the diagram are arbitrarily labeled; through P draw A'A'' parallel to MQ and PC' parallel to AM. Now to prove that P, R, and C are colinear, it is necessary to state a theorem of Euclid: If ABCD is a parallelogram, and AC is a diagonal, then we may pick any point P on AC such that the unshaded parallelograms have equal area. The following equalities are then obvious: Parallelogram A'C' = parallelogram PE and parallelogram A'C' = parallelogram A''F. Hence parallelogram PE = parallelogram A''F, or parallelogram EF = parallelogram RA''. This means that P lies on the diagonal RQ. Q.E.D.

Also solved by Mr. Rosenthal.

5 Express the volume of a regular dodecahedron in terms of the length of an edge.

The neatest solution comes from Mr. Severn, with a two-dimensional section.

Let the length of one side equal a. The volume V equals the surface area A of the solid times 1/3 the distance d to the center; and the surface area equals 12 times the surface of one pentagonal face. Therefore, $A = 12 [a/2 \times a/2 (\cos 36^\circ / \sin 36^\circ) \times 5] = 12 xa^2/4 \times 5 \times 1.3764 = 20.646 a^2$. $D = (a + x + y) \cos 30 = 2.5387 \times \sqrt{3}/2 \times a = 2.1985 a$. $d = D/2 = 1.0963 a$; $d/3 = .3654 a$. $V = 20.646 a^2 \times .3654 a = 7.544 a^3$.

Also solved by Mr. Yu, Mr. Rosenthal, Mr. Hoylman, and Norman L. Apollonio, '22.

Allan J. Gottlieb, '67, is a graduate student in mathematics at Brandeis University. "Puzzle Review" is written for Technology Review and Tech Engineering News, the M.I.T. undergraduate professional magazine.

Correspondence Review

Feedback for Auto Safety

To the Editor:

Thanks much for spelling out some defects in the automobile safety campaign, of which I had been only dimly aware.

Here is another viewpoint which seems to me to have a great potential for further working over. As every M.I.T. engineer should understand, the principle of feedback is just about the greatest for reducing error and putting us all on the right track.

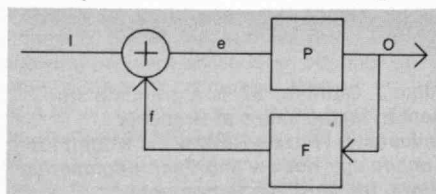
Here's how to make with feedback. Establish an error signal. Feed it into the powerhouse with such polarity and time constants as required to reduce the error signal to whatever (small) size you require or can afford.

The error signal is the difference between what you've got and what you want. The powerhouse works over what you've got to make it more nearly like what you want, thereby reducing the error, hopefully to zero, and as a very important by-product, thereby requiring much less power than is required by large errors.

The basic equation is: $O = (P/1 + PF)I$, and a little fooling with this equation can be very rewarding. O is output, I is input, or what we want, P is the powerhouse (no brains), F is the feedback (all brains, no power).

Try assigning numbers to P and F , like 100 is perfect and zero a complete bust, and run a few through. You will usually find that the product PF swamps the 1 which can then be neglected. Then you cancel the P 's and find that if brains are any good the answer is perfection and we all live happily ever after.

The equation is derived from this diagram:



1. $O = Pe$
2. $f = FO$
3. $e = I - f$
- 2 in 3 $e = I - FO$
- 4 in 1 $O = PI - PFO$
- juggle $O = (P/1 + PF)I$

Output is power times error. Feedback is brains times output. Error is input minus feedback.

Note that if the feedback comes too late it can change the sign and make matters worse instead of better.

What do you suppose would be the impact on next year's automobile sales and production if it could be publicized that car A kills three times as many occupants as car B? And do you suppose that the insurance companies have this information?

I long ago decided that omission of this obvious information from the safety scene means that the proponents are really pretenders who are a lot more interested in their own financial welfare and in skinning a few more dollars from an ignorant public than in really improving safety.

I would be deeply interested in seeing these ideas reviewed by a good sampling of M.I.T. alumni.

Benjamin B. Drisko, '23
Harrington, Maine

To a Technological Muse

To the Editor:

In reading the October-November issue of *Technology Review*, I noted that one contributor seemed to wonder at the absence of poetry. Accordingly, I have written the following poem "Beginning" in the hope that it might supply the lack.

The equations help to give the poem a modern touch, or so I fondly hope. The equations at the start of the poem summarize the corresponding lines of the poem; the equation at the next-to-last line states, in effect, that the probability of finding something somewhere is equal to unity.

Beginning

$$\nabla \cdot E = 0$$

$$\nabla \times H = 0$$

$$\int_{-\infty}^{+\infty} dm = 0$$

$$dm_{\infty} = 0$$

The divergence was zero.

The curl was zero.

Everything was zero.

Every part of everything was zero.

There was nothing at all,

Nothing material, not even empty space:

There was just the Spirit.

Then in all this nothingness

Where there was yet no man,

That word before all words spoke out

"Let there be light"

And there was light;

Before the sun, before the stars,

Before the daylight,

In the non-existent night

Before there was a night

There was a sudden light

A flaming mass of fire

As particle joined particle

To form the atoms

Fusing and splitting

In a surging sea of radiation

Forming hydrogen, helium and the rest,

With flaming energy

That jumped the incredible gaps,

Forming the sun and the stars and the

Pleiades

And the cooled-off sterile earth.

$$\int \psi(q) dq = 1$$

Now there was something;

Soon there would be man.


Laurence Burns, '27
Swampscott, Mass.

To the Editor:

May I add a comment to Mr. Mindel's review of *The Maze Maker* in the December *Technology Review*? The attraction that Icarus has had for some people, I among them, is that he symbolizes what Browning meant when he spoke of a man's "reach exceeding his grasp."

You might be interested in a short poem of mine on the same theme:

Scorn the Gods!
Born full grown,
They are.
Man becomes.



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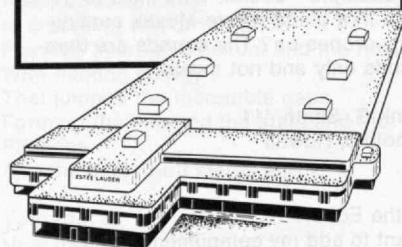
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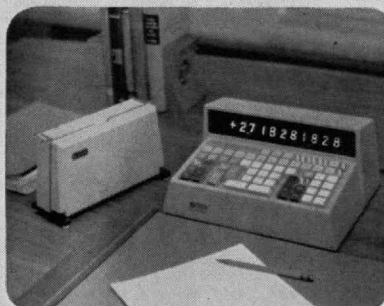
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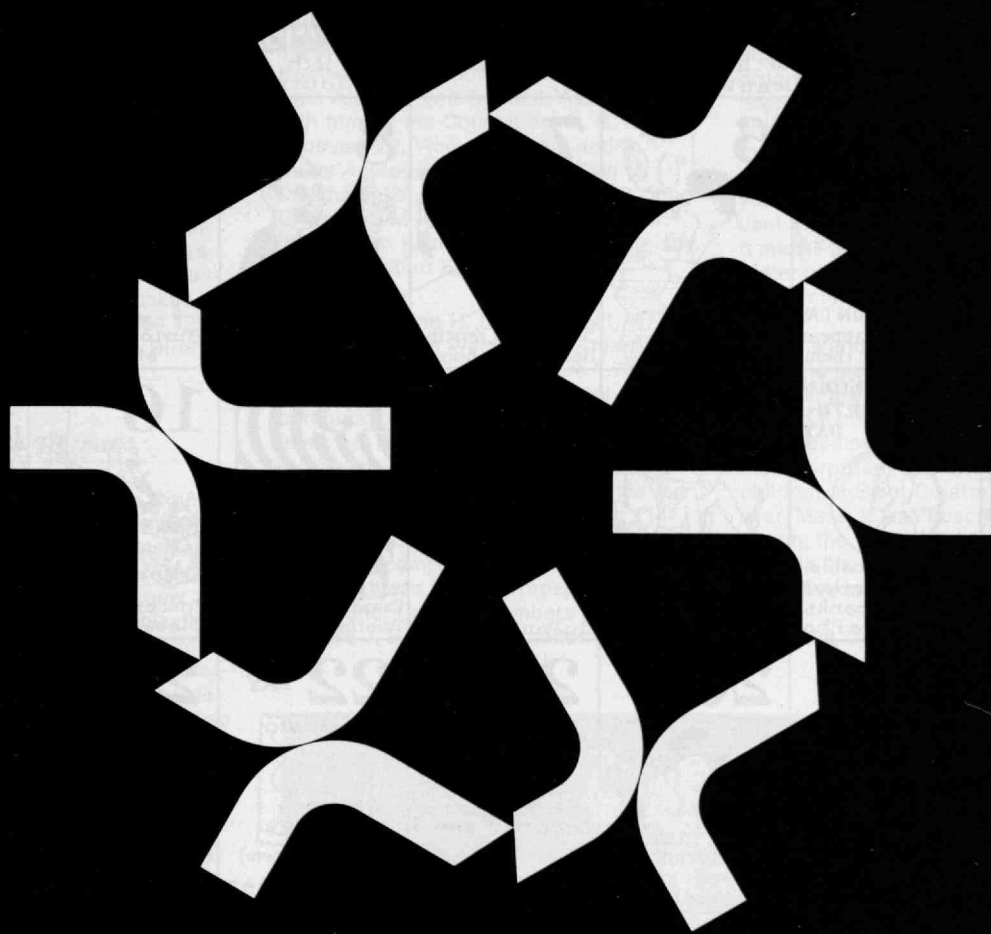
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Alumni Review



AN M.I.T. ALMANAC
for FEBRUARY 1968

S	M	T	W	T	F	S
 <p>FLORIDA QUEBEC N.Y. etc.</p> <p>Vacation Period~everyone on tour: Logarithms, Chairman Killian, Basketball Team, Concert Band, Dean Wadleigh, et al.</p>				1  <p>Fifth Annual Invitational Hockey Tournament at M.I.T.</p>	2  <p>CANDLEMAS DAY ~ Groundhogs reappear.</p>	3 
4  <p>Students recuperate from relaxing vacation.</p>	5  <p>REGISTRATION DAY Students reappear ~all 7,500 of them.</p>	6  <p>Only 105 days to end of term.</p>	7  <p>Swimming, Fencing, Hockey~all at home.</p>	8  <p>Boston alumni meet~Oyster House.</p>	9  <p>Burton House Mixer.</p>	10  <p>Class Secretaries ~April notes due!</p>
11  <p>Chamber Music (Kresge): Chigiano String Sextette.</p>	12  <p>LINCOLN'S BIRTH-DAY (Still a valuable coin~for sales taxes and piggy banks) → Creative Photography Exhibit ~duPont Gym →</p>	13  <p>Safety officers meet here.</p>	14 	15  <p>Canadian Perceptual Paintings ~Hayden</p>	16  <p>Concert (Kresge): Class of 1970.</p>	17  <p>Logarithms host Love Jam and Intercol. Barbershop Sing.</p>
18  <p>Students recuperate from artistic week.</p>	19  <p>Applied Math. Colloquium: "A Topic in Algebraic Theory of Automata."</p>	20  <p>1865 ~FIRST REGISTRATION DAY Students appear ~all 15 of them.</p>	21  <p>Basketball~Colonial Tournament at Tufts.</p>	22  <p>HOLI-DAY WASHINGTON (Collector's Item)</p>	23  <p>Chicago alumni go to the theatre. Skiing~Eastern Intercollegiate (Div.1) Championships at Middlebury.</p>	24 
25  <p>QUIN-QUA-GES-IMA no third BURTON HOUSE COMMONS Eat heartily~only 3 days to Lent</p>	26  <p>Alumni Council meets~Faculty Club.</p>	27  <p>FAT TUES-DAY FACULTY CLUB MENU LAST DINNER DOMINIC LENT VINEY FACULTY CLUB</p>	28  <p>Alumni Meeting: Dean Pounds at New York.</p>	29  <p>LEAP YEAR DAY McCORMICK</p>	 <p>and then.... MARCH! H.B. KANE</p>	

Alumni Review

1968 Alumni Fund: Regional Solicitation Begins

With total gifts of \$1,200,161 from 9,673 alumni toward its goal of \$2,700,000 and 20,000 participants, the 1968 Alumni Fund this month advances into the annual Regional Solicitation Program designed to increase Fund participation. Alumni committees are now being formed in over 200 communities to undertake personal solicitation of prior contributors, and regional chairmen and workers are still urgently needed in several communities, according to Robert Hagopian, Associate Director of the Fund. "The success of this program," he says, "depends entirely upon alumni who assume this responsibility for coordinating and carrying out the solicitation of those alumni whose response awaits a personal reminder." Those who can assume such responsibilities are asked to write or call (collect—(617) 864 1256) Robert Hagopian, '47, Associate Director of the Fund.

Alumni Fund: Three Area Councils Organized

Formation of the first three Area Councils of the Alumni Fund has been completed in Chicago, Philadelphia, and Washington, according to Kenneth S. Brock, Director of the Fund. The Councils are a new feature of the Alumni Fund organization designed to help match the Fund's regional activities to the unique characteristics of particular areas and to provide continuity in regional Fund leadership so that past experience can be effectively used for future activities. Organization meetings have been completed in Chicago, Philadelphia, and Washington, and Area Councils for San Francisco, Los Angeles, and New York are in the planning stage.

At an organization meeting on November 7, the Chicago Area Alumni Fund Council was established under the Chairmanship of Homer A. Burnell, '28; its other members include Bennett Archambault, '32, Philip L. Coleman, '23, Daniel J. Holland, '58, F. Richard Meyer, 3d, '42, Lewis W. Moore, '33, John T. Shutack, '43, Peter P. Sloss, '42, and Goff Smith, S.M. '53. The Chicago area has eight out of 11 regions organized with a total of

1139 alumni; participation in the 1967 Alumni Fund was 39 per cent, with total gifts of \$35,148, the average gift \$79—down from \$158 in 1966. The goal for 1968 in the Chicago area is 510 donors and \$38,000. Philadelphia, with 1412 active alumni, also had 39 per cent Alumni Fund participation in 1967 resulting in total gifts of \$57,014. The goals in Philadelphia are to organize 13 regions and obtain 635 Alumni Fund donors toward a goal of \$61,000, according to Robert E. Worden, '36, newly elected Chairman of the Philadelphia-Area Alumni Fund Council. Associated with him on the Council are L. G. Lee Thomas, '20, Vice Chairman, and A. Rufus Applegarth, Jr. '35, William M. Davidson, '26, Addison S. Ellis, '32, John C. Haas, S.M. '42, Lester C. Hopton, Jr. '59, Joseph Kozol, '54, Nelson E. Stefany, '61, and Robert E. Wilson, '45.

Captain Sterling H. Iverson, Jr. '41, is Chairman of the Washington-Area Alumni Fund Council, where there are 1,738 active alumni and a 1967 Alumni Fund participation of 43 per cent; the 1968 goals are \$29,600 and 850 donors. In discussing these goals at the Council's first meeting, Captain Iverson pointed out that the Washington area includes 1144 prior contributors to the Fund, and a telephone campaign will be organized to reach these "prime" prospects for the 1968 Fund. Council members include Richard J. Donohue, '39, Milton E. Esso-

glou, '55, David E. Gushee, '50, Adolf C. Hendrickson, '51, Charles C. Joyce, Jr. '56, Thomas K. Meloy, '17, Thornton W. Owen, '26, Donald A. Roellke, '57, C. Haskell Small, '30, David W. Weiss, '52, and Harry J. Zimmer, '51.

Boston Stein Club: Education of the Exceptional Child

By definition, an exceptional child is one who is special. Educating such children poses its special problems. A school program must be designed and administered in a way which can help such children make maximal use of their mental equipment. We frequently hear of school programs set up to help gifted youngsters make the most of their brilliant minds. It is generally accepted that it makes good sense for the educational system to go out of its way to cultivate these intellects.

There is another side to the coin, however: the mentally retarded child. These children are also exceptional. At their second meeting of the season members of the Boston Stein Club heard about an active program operating to educate such children at Saint Coletta School, Hanover, Mass. It was described by Sister Shaun, the School Superintendent, in her talk "Is a Retarded Child Entitled to an Education?"

The Saint Coletta School accepts stu-



This conference on conferences was the fortunate by-product of the 1967 Alumni Seminar at M.I.T. in September. Committee members for regional conferences planned in 1968 by M.I.T. clubs in Philadelphia and Dallas met for lunch to learn the secrets of success from committeemen who have helped stage recent meetings. Clockwise around the table are Otto E.

Kirchner, Jr. '49, of Seattle; Jack C. Page, '48, of Dallas; Henry W. Jones, '26, of Philadelphia; and G. Peter Grant, Jr. '35, of M.I.T. The M.I.T. Club of the Delaware Valley will host a regional conference in Philadelphia on March 9, and the scene will shift to Dallas on March 30, 1968. (Photo: Ivan Massar-Black Star)

dents on the basis of the action of its ten-member board on applications for admission. Students are accepted if the Board feels the school program can help a particular child. Admissions are limited by the number of children the school can handle. Resident students have varying religious and racial backgrounds. The educational program offered was discussed in detail. A placement program for students on graduation is also functioning. The Saint Coletta School is dependent on private funds for its operation. It derives none of its income from public or Catholic charities.—Melvin H. Saxe, '48, 64 Williams Road, Lexington, Mass. 02173.

Washington, D.C.: "All We Can See is Darkness Ahead"

Can the concepts of "think tanks" and systems analysis which America has devised to solve the technological problems of defense now be turned with equal effectiveness to the social and political issues of our urban ills? Or does the human element add an incompatible dimension? These were the controversial and unanswered questions before five speakers at a half-day seminar of the M.I.T. Club of Washington on December 16. There are no answers yet, they said, because America's urban problems now have unprecedented dimensions and because there has never been an urban counterpart of the massive research and development resources which have built America's military strength. In 1967, even the M.I.T. Department of Political Science had more research money than the U. S. Department of Housing and Urban Development, said H. Ralph Taylor, Assistant Secretary of H.U.D.; in fiscal 1968 H.U.D.'s research budget is \$10 million. The errors of the past—institutional public housing and non-integrated suburbs, many of which have been created under specific government policy—are evidence, he said, that our preconceptions about urban problems are likely to be wrong, that the problems are not to be solved without massive new research resources and new research institutions.

Bernard A. Schriever, who was Commander of the Air Force Systems Command before his recent retirement

from active duty, admitted that today's urban problems are "more complex by an order of magnitude" than any weapons system problem, but he expressed his confidence that the basic issue is "not so different from a planning and management point of view." Almost all the technology to solve these problems exists, he said, and our need is to examine the problems in a total systems context to show how the elements are interrelated; then, he said, we must develop demonstration projects which will be comparable to the prototype testing activities familiar to the military.

But Carroll L. Wilson, '32, Professor of Management at M.I.T. warned that urban problems are "profoundly different." The client for the I.C.B.M., he said, was easy to see, its performance requirement easily specified. But the urban problem has many clients, its goals are human—not physical, and the need for citizen participation suggests to him that it may be a very different management problem. The human element, which may make urban problems no different from others to which systems analysis has been applied, is itself little understood. "There is no alternative to a walking tour of the ghetto to see what it is really like," Mr. Taylor told the M.I.T. audience. He fears that new programs will be "captured by the establishment," not developed from a deep understanding of the fundamental problems. For example, he said, new housing has no value "if the hope of its residents is destroyed."

Wiley A. Branton, Executive Director of the United Planning Organization serving the Washington, D. C., area, emphasized that the central factor is "the fatigue of trying to survive, the distrust of the bootstrap system which has not worked." We must somehow, he said, "help people feel they are a part of the community and have a real stake in what happens to it." William Taylor, Staff Director for the U. S. Commission on Civil Rights, also emphasized these human problems. People in the ghetto, he said, have an overpowering sense of powerlessness and isolation; they sense an inability to affect their own destiny. It is, he said, "as if there were two alien nations within the same country." Young people growing up in this environ-

ment tell him, "All we can see is darkness ahead."

The U. S. Commission on Civil Rights, for which Mr. Taylor is Staff Director, concluded that the situation of negroes in the slums is not analogous to that of the nineteenth century immigrants to the U. S. "The legacy of slavery persists," he said, society's needs have changed, and the barriers are "far more formidable." There are no effective local political units to which these people can relate and through which their appeals can be organized. In all urban problems, he insisted, segregation remains the central issue.

More than 150 Washington-area alumni attended the seminar, which was followed by a panel discussion moderated by Lawrence W. Conant, '21. Abraham Katz, '50, and Gordon T. Yamada, S.M.'62, were Co-Chairmen.

Puget Sound: Club Receives Bronze Beaver Award

On November 30 the M.I.T. Club of Puget Sound held its winter meeting at the Glendale Country Club in Bellvue, Wash. The featured program for the evening was a talk by Halsey C. Herreshoff from the Department of Naval Architecture at M.I.T. who told the exciting story of the Americas Cup races. Mr. Herreshoff was a consultant for the winning boat *Intrepid*. He showed some of the interesting work done at M.I.T. which affected its design and that of other yachts. There appears to be much in common between the problems of sailing yachts and airplane designs.

A highlight of the evening was the presentation of the Bronze Beaver award to the M.I.T. Club of Puget Sound. This, the Association's highest award, is given for outstanding service to a few individuals each year and on occasion to groups of alumni. On hand to make the presentation was Fred G. Lehmann, '51, Alumni Secretary, who stated that the Executive Committee of the Alumni Association had singled out the M.I.T. Northwest Regional Conference of a year ago, the continuing interest of area alumni in the M.I.T. students from the Northwest, and their ties of friendship built up over decades as well as the unique ties

During the half-day seminar at the M.I.T. Club of Washington, D.C., on December 16 five speakers discussed the controversial and unanswered questions: Can the concepts of "think tanks" and systems analysis which America has devised to solve the technological problems of defense now be turned with equal effectiveness to the social and political issues of our urban ills? Or does the human element add an incompatible dimension?

(Photos: William G. Osmun '40)

President J. Edgar Hoover, Director of Federal Bureau of Investigation, speaks at a luncheon session of a meeting held to discuss the role of the CIA in 1967 in future shared activities.



between the Institute and the alumni in the Northwest which have been built over the years. Chairman of the Regional Conference last year in Seattle was J. A. Samuelson, C.E.'40, under whose leadership this conference became the prototype for future affairs of this kind. However, in recognition of the scores of alumni who had been on Mr. Samuelson's committee and of those alumni who for years have contributed to the spirit of M.I.T. in the Northwest, the award was actually given to a member of the audience at random and shared by all 135 people present. Who is to retain custody of the award remains a question.

A new set of Constitution and Bylaws were adopted unanimously and the following new officers of the club were elected: President, Otto E. Kirchner, '49; Vice Presidents, Clarence Howell, Jr., '45, and Paul Sanders, '51; Secretary, Martin Anderson, '56; Treasurer, Thomas

Rona, '53. An enthusiastic vote of thanks was given the two retiring officers, Club President Andrew T. Hengesteg, '55, and retiring Club Vice President Hans Bebie, '39.

Long Island: The Lost Harbor of Ashdod

Almost 130 alumni, wives and guests attended the holiday dinner and dance of the M.I.T. Club of Long Island at the Roslyn Country Club on Friday, December 15. A highlight of the evening was an illustrated talk on "Probes and Pingers in Oceanographic Research" by Harold E. Edgerton, Sc.D.'31, Institute Professor in the Department of Electrical Engineering. Always an interesting and engaging speaker, Professor Edgerton gave special attention to his recent work in Israel which involved surveying the ocean floor in search of the ancient lost harbor of Ashdod and the remains

of Phoenician galleys in it. According to Dr. Edgerton, they are still lost.

The most important part of the evening was the announcement of the reorganization of the M.I.T. Club of Long Island into a fully independent organization, officially recognized and chartered by the M.I.T. Alumni Association. The Club will coordinate with the Alumni Center of New York and other regional clubs in the area. Outgoing President John T. Sherman, '31, introduced the new officers and members of the Board of Directors and turned the meeting over to Robert Draus, '42, the incoming President, who spoke briefly of the new officers' plans to establish the Club as a meaningful entity to alumni and the community. Ned A. Spencer, '46, Vice President for Programs, announced plans for an election meeting on April 26, a beach party and clam bake on June 29, and a freshman picnic and barbeque on August 24.

Some of the alumni, wives and guests attending the holiday dinner and dance of the M.I.T. Club of Long Island at the Roslyn Country Club on Friday, December 15 were (left to right), Mrs. Edgerton, John Sherman, '31 (past President), G. Peter Grant, '35, Director for Clubs, M.I.T. Alumni Association, Mrs. Grant, Dr. Harold E. Edgerton, Sc.D.'31, Arnold Whitaker, '46, Treasurer, Mrs. Kraus and Robert Kraus, '42, President. (Photo: Adrian G. Marcus '42)



Frederick G. Lehmann, '51, Secretary of the M.I.T. Alumni Association, leads a discussion session at a meeting held to consider the role of the Class of 1967 in future alumni activities.



Class of 1968: "55,000 Bosses"

More than 35 members of the Class of 1967 met with officials of the M.I.T. Alumni Association at Endicott House in Dedham late in December to begin planning the Class' role in future alumni activities. Frederick G. Lehmann, '51, Secretary of the Association, and Kenneth S. Brock, '48, Director of the Alumni Fund, led a discussion session before dinner; and Donald P. Severance, '38, Executive Vice President of the Association, spoke briefly after dinner. Referring to all those officers of the Alumni Association present, Mr. Severance told the seniors that "we have 55,000 bosses"—all the members of the Association.

Alumni Calendar

New York—dinner meeting of the Graduates Alumni Association, Sloan School of Management, on February 2 at 6:00 p.m., at the Americana Hotel: "How to Survive in the Jungle—Without Losing Your Mate," William F. May, Chairman and Chief Executive Officer of the American Can Company.

Boston—luncheon meeting on February 8 at the Union Oyster House: William W. Seifert, Sc.D.'47, Assistant Dean of



Technology Review's photographer attended the inaugural meetings of two Alumni Fund Area Councils this fall. In Washington the group included Jack Phillips, Jr. '38, President of the M.I.T. Club of Washington (at the head of the table in the top picture), and to his left Charles C. Joyce, Jr. '56, David E. Gushee, '50 (hidden), Kenneth S. Brock, '48, Sterling H. Iverson, Jr. '41,

David W. Weiss, '52, and Harry J. Zimmer, '51. In Philadelphia the conferees were (around the table clockwise) Addison S. Ellis, '32, William M. Davidson, '26, A. Rufus Applegarth, '35, L. G. Lee Thomas, '20, Robert E. Worden, '36, Kenneth S. Brock, '48, Nelson E. Stefany, '61, Lester C. Hopton, Jr. '59, and Joseph Kozol, '54.

the M.I.T. School of Engineering.

Framingham—dinner meeting in the Framingham area on February 8: James Elms, Director of the Electronics Research Center, N.A.S.A.

Baltimore—dinner meeting at the Engineering Center of Baltimore at 6:15 p.m. on February 8: Charles P. Crane, Chairman of the Airport Board, Friendship International Airport.

New York—joint dinner meeting of the M.I.T. Alumni Center of New York and the Harvard Club of New York on February 14, 5:30 p.m. at the Harvard Club: Richard L. de Neufville, '60, Assistant Professor of Civil Engineering, M.I.T., will moderate a Harvard-M.I.T. student panel on urban crisis.

Chicago—dinner and theater party at the Ivanhoe Theater and Restaurant on February 23.

New York—luncheon meeting at Brass Rail Park 100 Restaurant at 12:00 noon on February 28: William F. Pounds, Sloan School of Management.

Atlanta—joint dinner meeting with Harvard Business School and Wellesley Alumni Clubs on February 29: Jerome B. Wiesner, Provost of M.I.T.

Philadelphia-Wilmington—M.I.T. Delaware Valley Conference, "Technology, Tomorrow, and You" on March 9 at the Sheraton Hotel: Howard W. Johnson, President of M.I.T.; James R. Killian, Jr., '26, Chairman of the M.I.T. Corporation; Irwin W. Sizer, Dean of the M.I.T. Graduate School; Alfred Keil, Head of the M.I.T. Department of Naval Architecture and Marine Engineering; D. Secor Browne, Associate Professor of Flight Transportation, M.I.T.; Robert W. Mann, '50, Professor of Mechanical Engineering, M.I.T.

Boston—luncheon at the Union Oyster House on March 14: John Bush, Vice President of the Millipore Corporation.

New York—repeat session of the Introductory Computer Seminar at the I.B.M. Product Display Center on March 14-15.

Mexico—Annual Fiesta of the M.I.T. Club of Mexico on March 14-16 in Mexico City.

Northern New Jersey—concert by the M.I.T. Symphony Orchestra at Montclair State College at 8:30 p.m. on March 25.

Chicago—Concert by the M.I.T. Symphony Orchestra at George Williams College, Downers Grove, on March 29.

Dallas—M.I.T. Southwest Conference, "The City in the Year 2000" on March 30 at the Marriott Motor Hotel: Howard W. Johnson, President of M.I.T.; Gregory Smith, '30, President of the Alumni Association; John E. Burchard, '23, Professor of Environmental Design, University of California (Berkeley); Walter A. Rosenblith, Chairman of the Faculty; D. Secor Browne, Associate Professor of Flight Transportation; John F. Collins, Visiting Professor of Urban Affairs, M.I.T. (former Mayor of Boston); Arnold E. Amstutz, '58, M.I.T. Associate Professor of Management.

New York—luncheon meeting on April 5: Julius A. Stratton, Chairman of the Ford Foundation, President Emeritus, M.I.T., and Chairman of the President's Marine Sciences Commission.

Boston—luncheon meeting on April 11 at the Union Oyster House; Mrs. Karl T. Compton.

Cambridge—class reunions on June 7-9 and Alumni Day on June 10.

Cambridge—Alumni Seminar on September 7-9.

Deceased

Charles H. Urban, '91, October 25
Robert D. Farquhar, '95, December 6*
George W. Allen, '01, November 25
Harry A. Putnam, '01, March 1
Lewis E. Moore, '02, October 23
Henry H. Saylor, '02, August 22
Edward J. Stone, '02, November 14
Royal L. Wales, '02, November 18*
William M. Gilker, '03, December 4
Leroy L. Thwing, '03, December 17
Mrs. Katharine Dexter McCormick, '04, December 28
John E. Lynch, '05, September 28*
Willard E. Simpson, '05, June 6
Converse Smith, '05, December 13
Winfred A. Taylor, '05, March 14
George W. Burpee, '06, November 7
John H. Cady, '06, September 15*

G. Curtis Noble, '06*
Franklin Adams, '07, November 27
Herbert G. Spear, '07, October 18*
Stanley B. Purdy, '08, 1966
Haylett O'Neill, '09, December 13*
Edgar M. Post, '09, June 27
George S. Humphrey, '10, October 27
J. Macaulay Costner, '12, August 11
Henry W. Dew, '13, June 17
Lionel H. Lemaire, '13, November 12
Gerald Beard, '14, August 17
Ralph C. Goeth, '14, October 9
Gabe Hilton, '15, November 12*
William W. Cargill, '17
Guy A. Gray, '17
Harry U. Camp, '18, November 4
Willard E. Imhoff, '18, November 6
Ralph P. Abercrombie, '20, November 16
Everett R. Harman, '21, July 18
John M. McClelland, '21, December 11
Olin W. Scurlock, '21, July 21
Homer L. Bigelow, Jr., '22, November 3
David M. Minton, Jr., '22, November 12*
Harry M. Noelke, '22, October 15
Charles Thomas-Stahle, '22, September 19
Richard C. Thompson, '22, August 22
A. Griffin Ashcroft, '23, June 24
Lev V. Goriansky, '23, August 8
William V. Cash, '24, December 21
Sarkin M. Zartarian, '24, December 21
William D. Wolfe, '27, July 17
Edwin A. Francis, '28, July 8, 1966
Norman Earle, '29, November 18*
John P. Kennedy, Jr., '29, February 5, 1967
John F. Lucey, '29, November 10*
George W. Schaible, '30, September 26
Andrew M. Tiernan, '30, May 3
Sidney A. Altshuler, '32, July 6, 1966
Parker H. Devlin, '32, December 2
Samuel N. Alexander, '33, December 9
Michael Paskowski, '36, November 19
Russell S. Omdahl, '38, October 20*
Samuel E. Swasey, '38, November 14
Bernard W. Sakmann, '39, October 22
Joseph L. Cowhey, '40, August 20
Edward L. Hurst, '41, November 8
George W. Richardson, '42, November 4
William A. Small, '42, November 8
Gerald L. Mac Kinnon, '45, December 7
Robert L. Deming, '48, November 21
Walter R. Stahl, '51, July 30
Monroe R. Weinstein, '53, November
Thomas L. Falvey, Jr., '54, November 19
Ralph Brown, '57, December 13
Alan Hollander, '61, October 7*
Robert W. Lillard, '62
Harold C. Barnes, '66, May 29*
*Further information in Class Review

Class Review

95

We are sorry to report the death of **Robert David Farquhar**, December 6, 1967. Robert, who had been living in California with his brother Francis and sister-in-law, leaves two sons, John who is living in Los Angeles, and David who is living in New York. A year ago Robert flew to Los Angeles to receive an award for an outstanding building which he designed. He was a member Fellow of A.I.A., graduated from Harvard in 1893, and from M.I.T. in 1895. . . . Our mail to **John Dyer, Jr.**, Albany, N. Y., and to **Luther Conant**, Westport, Conn., returned unclaimed. Can anyone give us information about these men?—**Andrew D. Fuller**, 1284 Beacon Street, Brookline, Mass. 02146

96

Among the 50 eldest alumni listed on the Honor Roll, as of October 1, 1967, are eight of the Class of '96: **Delia M. O'Connell**, graduate of Vassar; **Charles M. Stamp**; **Herbert D. Newell**; **George E. Harkness**; **Charles Johnson**; **Richard O. Elliot**; **R. E. Bakenhus** and **William D. Coolidge**. . . . **Harold Boardman** sent me an interesting letter to "check-in" with the Secretary in class notes. He spent the summer at Hancock Point, five miles across Frenchmans Bay from Bar Harbor. His many friends helped to relieve his lonesomeness while living there alone for the first time. He has returned to Waterville for the cold winter season and has ordered some yellow birch and mahogany and intends to keep busy with his woodworking. Ex-President Boardman's (University of Maine) interest in woodworking recalls our Ex-President of M.I.T., John Daniel Runkle, who was associated with '96 as a Professor of "Analyt" when we were sophomores. Long before that he advocated manual training (woodworking) as part of the public school curriculum. As a member of the Brookline School Committee, he arranged for a room in a new grammar school equipped with carpenter benches and tools. This school served as a model for manual training in many grammar school courses of study.—**James M. Driscoll**, Secretary, 129 Walnut Street, Brookline, Mass. 02146

98

Alvan Davis of Waterbury, Conn., writes that he lives alone and is doing his own cooking and cleaning. He has not seen nor heard from any '98 classmates during the past four and a half years, since he attended the 65th reunion. He hopes to get to M.I.T. for the 70th in June. How wonderful! I hope you all can make it, and I will see you there. Alan went on to say "I play checkers and chess, also enjoy duplicate tournament bridge and get in a game each Friday. I enjoy cross word puzzles and reading, which I do by an open hearth fire. I have one brother still alive, Edward H. Davis, M.I.T. class of 1901, who is hale and active socially. He is known as the Sage of Waterbury." . . . **Robert Lacy** had lunch in his home town with some M.I.T. Alumni on November 13, 1967. The M.I.T. Estate Secretary, D. Hugh Darden, visited the Engineering Society of Baltimore with the following M.I.T. men present: Bartow Van Ness, Jr., 1922, Dugald C. Jackson, Jr., 1921, William B. Spencer 1915, W. Watters Pagon 1907, and Robert Lacy 1898. . . . More about Classmate **Arthur L. Goodrich** who died on July 10, 1967 at the age of 91. He was Emeritus Associate Professor of Drawing and Descriptive Geometry in the Department of Mechanical Engineering. Professor Goodrich joined the M.I.T. staff as an assistant in 1902, following his graduation in chemical engineering. He became instructor in 1905 and joined the faculty as Assistant Professor in 1917. Until his retirement in 1947 he served for 21 years as Associate Professor.—**Mrs. Audrey Jones Jones**, Acting Secretary, 232 Fountain Street, Springfield, Mass. 01108

99

"In grateful recognition of the outstanding record of the Class of 1899 in the 1967 M.I.T. Alumni Fund, this certificate is presented to its Class Agent **Hervey J. Skinner**, '99." And on his 90th birthday on October 6 the friends of Hervey J. Skinner expressed their hearty approval of his many activities that have made Wakefield such a pleasant residential town. Among them, he was on the Board of Library Trustees for 47 years, on the Special Water Commission, President of the Bear

Hill Golf Club, Trustee and President of the Wakefield Savings Bank, Treasurer of the Wakefield Historical Society, Trustee of the Andover Newton Theological School, President of the Boston Baptist Social Union and Technical Advisor to the Associated Industries of Massachusetts.—**Percy W. Witherell**, Secretary, 1162 West St., Wrentham, Mass. 02093

02

I am indebted to **Ed Nelson** for the following clipping from the Providence Journal of Sunday, November 19, 1967: "**Royal L. Wales** Dean Emeritus of the College of Engineering at the University of Rhode Island died yesterday at Marblehead, Mass. Dean Wales retired from what was then Rhode Island State College in 1945. He was first dean of engineering at the school and had taught there for 37 years. On his retirement the school conferred on him the honorary degree of doctor of engineering. As was noted then, engineering at the school was almost synonymous with his name. Six years ago a new mechanical engineering building was named the Royal L. Wales Building. Dean Wales joined the faculty in 1908 as a professor of mechanical engineering. Previous to this he had been associated with North Carolina State College and the Massachusetts Institute of Technology, from which he was graduated in 1902. Dean Wales was made head of the engineering department when he came to Rhode Island and was subsequently, made dean of the school of engineering. In Dean Wales' years at the state college, engineering grew from a department to a school, and enrollment increased sixfold. A man who traveled widely in Europe, Dean Wales also was active in his contributions to technical journals and by his membership in numerous organizations. These included the American Society of Mechanical Engineers, the Providence Engineering Society, the National Association of Production Engineers and the Amercian Society for Engineering Education. Until five months ago, when he was moved to a nursing home in Marblehead, Dean Wales lived at 12 Campus Ave., in Kingston. He was the husband of the late Rose (Blake) Wales, he was born in Groveland, Mass., November 25, 1878. Survivors include three sons, Lawrence

E. and Linwood O. Wales both of Marblehead, and Royal T. Wales of Dover, N. H.; 10 grandchildren and four great-grandchildren. . . . **Bill Kellogg** writes that he is active. He went down to Richmond to attend a meeting of the board of directors of the Virginia Electric and Power Company of which he has been a director for 40 years and is now an honorary director. As a farmer Bill was blessed with copious rains in the growing season, and the balance is on the right side of the ledger.—**Burton G. Philbrick**, Secretary, 18 Ocean Ave., Salem, Mass. 01970

03

Well, Classmates, **Ike Atewood** and your Secretary represented our Class of 1903 at the November Alumni Meeting at the Faculty Club. We were enveloped by the huge audience of alumni but honored with the fortune of sitting before the head table to view and hear the speakers. We thought back to the times when we used to take our early customary stroll along Boylston Street to the Thorndike Hotel at Park Square, once passing President Pritchett, to acquire our noon-day snack thus avoiding the crowded lunch counter in the basement of the Rogers Building. The main discourse at the meeting was given by Dr. John H. Knowles who is the first Harvard man in recent years to address the Alumni Council. He spoke analogously, referring to his Herculean task of solving the financial budget of all Boston hospitals. Everyone listened intently. President Johnson furnished a fitting climax to the program by talking about past M.I.T. accomplishments and impending plans.

The National Magnet Laboratory at M.I.T., home of the world's largest powerful magnet, was renamed in a ceremony on November 21, in honor of the late Dr. Francis Bitter. Dr. Bitter was one of the world's leading authorities on magnetism, and was a member of the M.I.T. faculty for 33 years. He died last July. On November 20 leading physicists met at a symposium on physics and magnetic fields in honor of Dr. Bitter. The National Magnet Laboratory represented the culmination of Professor Bitter's work on powerful magnetic fields. It was with a Bitter magnet that the strongest magnetic field ever achieved by man was generated.

Our happy birthday greetings go to: **Frederick K. Lord**, XIII, February 5, 1878, of New Rochelle, N.Y.; **Mrs. George H. Hamilton** (nee: Elizabeth L. Williams), VIII, February 8, 1879, of Enfield, N.H.; **William C. Lounsbury**, VII, February 13, 1880, of Janesville, Wis.; **Louis B. Rapp**, III, February 3, 1881, of Gainesville, Fla.; **Frederick A. Olmsted**, X, February 27, 1882, of Mill Valley, Calif.; **Ichabod F. Atwood**, II, February 28, 1882, of Newtowne Farm, Topsfield, Mass. . . . **Gus Eustis**, III, is very active and writes that he is preparing for his winter sojourn in Florida.—**John J. A. Nolan**, 13 Linden Ave., Somerville, Mass.; **Augustus H. Eustis**, 131 State St., Boston, Mass.

05

I have a very interesting eight-page letter from **Hal Robbins**, I, which tells us he is able to get around. It is a wonderful travelogue covering the South Pacific, visiting such places as Tahiti, Leeward Islands, Moorea, New Zealand, various cities in Australia, Fiji Islands, Western Samoa, Pago Pago, and Honolulu. Unfortunately he has forbidden me to publish the contents, but it makes wonderful reading. Possibly some of his old pals, by addressing him (Hallet R. Robbins, Orangewood Apts., 202-8-7550 No. 16th St., Phoenix, Ariz. 85020) could persuade him to let you have his 1967 Christmas news letter. It's worth a try. . . . Through the secretaryship of his daughter I learn this about **Converse Smith**, whom we had not heard from for some years: "I have been fully retired for over a year and since September of this year, with the exception of a few weeks living with my daughter in Windsor, Conn., I have been confined at the New Haven hospital for an undisclosed ailment that they have been unable to pinpoint, either the cause or the cure. I find it very monotonous being able to take only a few steps from the bed to the sitting room." . . . A letter from **Arthur H. Howland** says that he "fares pretty well considering." He has disposed of his property in Larchmont and expects to move to Boston or the vicinity so he can see what the new M.I.T. looks like.

Another old timer, **Phiz Physeck**, I, whom I had not heard from for at least 20 years writes as follows: "I am in my 88th year and am healthy and neither look—nor act—my age. I have been retired for about 16 years, and we own a small apartment house here and have a little other property. I had an exchange of correspondence with **True H. Files** about a year ago, and while he was alive I had a continuous exchange with **Fred Bennett** of Southampton, who with Files was a very close friend. These two were my only close intimates except for **H. A. Kirkwood** with whom I roomed, and who was a special student taking only drawing and there for only one year, 1901. I came West in 1904 and have lived here ever since except for a four-year sojourn in Florida. That seems to be my life and works. I am a life member of the Walla Walla, Wash., Elks Lodge, and am a 32d degree mason."

This seems to be an issue from several long time, no see classmates. **A. Senior Prince**, X, writes: "I still come down to my office four days a week though it is true I only stay a short time and I do nothing in the running of the business. When my son came home from the war in 1946 he came into the business with me and since that time has made quite a success of his business life. We now have 14 stores. As I said I have nothing to do with the running of the place anymore, and all I do is sit still and wait for dividends to appear." . . . I have received through the Alumni Association notice of the death of **John E. Lynch**, II,

on September 28, 1967. Jack, who was with us in mechanical engineering for three years, the quiet type, was employed in the drafting offices of Stone and Webster and Charles T. Main for many years and recently lived with relatives in Melrose. No other details to date.—**Fred W. Goldthwait**, Secretary, Box 32, Center Sandwich, N.H. 03227

06

A few cards have already arrived this first week in December, and ours are beginning to go off to distant areas. A few letters have arrived too. **George Shingler** had noted the report of his daily walk—being a spry young fellow of 88—and said he had learned to walk years ago while he was working. He wanted to know how many of the Class are still living and their names. I have told him that the Secretary's record shows 108 living as of December 1, 1967. The total number in the Class varies, depending on who is included. Some who were with us a year or two have wanted to be affiliated with '04 or '05 or '07. My count would make a total of 575 of whom about 275 survived and were candidates for degrees and submitted a thesis. Someday I will type that list of 108 living and send it to George. If you would like a copy send me a newsy letter—not a postcard! . . . In the same mail came an interesting letter from Irving Peskoe, '39, from Homestead, Fla. The reason for writing to me was a session he had with **Bill Sheldon** who built a winter home there some 10 years ago. They summer on Cape Cod and still have some connection with Alma, Colo., where he was active in mining for years. His career was included in the class notes of April 1957. In his letter to me Irving relayed Bill's account of that "Tech Riot" in the fall of 1904—remember? I still have the blood stained cap I wore that night, and few others still have mementoes. It is strange how history repeats.

In a recent paper appeared an article about food—especially meat—inspection and in the June 5, 1906, issue of the long defunct Boston *Evening Transcript* there was a long article headed, "Meat Must be Inspected—Revolted Conditions Demand Prompt Legislation—Report and Special Message by President Theodore Roosevelt," with a column or more quoting the message. For some unknown reason my father had clipped that article and it is now a treasured possession for would you believe it, on the other side is a column report of "Tech's Class Day" none other than '06. The exercises were held in Huntington Hall in the Rogers Building and included are the addresses of Max Coe, President; Herman Henrici as First Marshall; Charles Wetterer as Historian; W. F. Englis as Prophet; George Henderson presented gifts (of various kinds!) and the final address was by the Class Orator, Joseph T. Lawton. Does this stimulate some memories? . . . As some of you probably know, M.I.T. and Wellesley College are planning an

exchange of some students. In fact, as reported in the October number of the *Wellesley Bulletin*, four students—two from each are already doing it. Among the M.I.T. representatives on the joint committee planning the cooperative program is Miss Emily Wick, '51, **Jim Wick's** daughter, who is Associate Dean of Student Affairs and Associate Professor of Food Chemistry.

In the November notes four deaths were reported, "careers later," and here they are. **John Gooding Doten**, who was with us only one year, died January 6, 1967, probably in Cohasset where he had resided since 1934. The file card contains only addresses. . . . **Mildred Eleanor Blodgett** obtained her degree in geology and for some years was an instructor at Mt. Holyoke College after teaching math and science at the Pittsfield High School. Our 1916 history just gives an address, Riverside Recreation Grounds, Auburndale. By or before 1918 she entered the Convent of St. John the Baptist in Ralston, N. J. (Sister of Mercy) which was her address until the middle or late 40's when she was at St. Helen's Hall in Portland, Ore. After a few years there Sister Mildred Eleanor was back at St. John the Baptist where she died March 13, 1967, after a long and useful life. . . . The death of **James Howard Means** on September 3, 1967, was reported on page 69 of the October-November *Review* and told of how his use of radioactive iodine for thyroid led to the building of the M.I.T. Cyclotron. He was with us only two years and then switched to Harvard, getting his A.B. degree in 1907 and his M.D. in 1911. He interned at Massachusetts General and after a few years there had devoted his life to teaching research, except for Army service during W.W. I in the Medical Corps. In 1955 he was Physician-in-Charge, M.I.T. Medical Department. . . . **E. Harley Daniels** was with us only freshman year. The Alumni Fund learned that he had died but had no date.

John Hutchins Cady, IV, (Ph.D. Brown '03) was born January 17, 1881, in Providence and died September 27, 1967, probably in Providence where he had always lived and worked, except for a couple years in the office of a Boston or New York architect and a year of study at the Atelier Duquesne in Paris. He had been in private practice as an architect in Providence and was with us the last three years and a member of the Architectural Society. . . . **George Curtis Noble, IV, S.B.**, was born July 1, 1882, in Eau Claire, Wis., and has been "assumed deceased" by the Alumni Office. He prepared at the University of Wisconsin and was a member of the Architectural Society and the Wisconsin Club. His thesis was, "A College Library." After graduating he was an architectural draftsman for some 15 years first in Denver, then Flagstaff, Ariz., then Chicago. From 1919 until the mid-40's his address was c/o Mrs. J. H. Noble in Chicago, Los

Angeles, Hollywood, back to Wisconsin, then Phoenix and soon back to L. A. where his last address was 219 W. 7th St. . . . As you may recall, **Joe Santry** died May 9, 1967, and I learned later that he had made plans for a cherished possession. Clippings from several papers came to me reporting the burial at sea of the schooner *Pleione* on September 28 about two miles south of Fisher's Island, stripped of top hamper but with a flag waving at the stern, "to fulfill the wish of her late owner." **Stew Coey** sent me a clipping from the *New York Times*, a long article giving the yacht's history and picture and quoting Joe's wishes that "she be given a burial at sea—her Valhalla. It was the love of a great sailor for a great ship," a 53-year-old veteran that won numerous cups and trophies. I would like to include more of that history but these notes are long enough for now.—**Edward B. Rowe**, Secretary-Treasurer, 11 Cushing Road, Wellesley Hills, Mass. 02181

07

I have had some correspondence with Harry C. Lord, '08, of St. Petersburg, Fla. He wrote me for information about Art Tylee, Becky Sharp, Byron Luce, and Bebe Hosmer. I sent him what information I could and also one of our lists of Living Members. It seems that Harry was one of five men who entered '07 from Lynn Classical High School. Because of sickness, Harry did not graduate until 1908 and so is listed with that class. I quote an interesting sentence from his letter. "Those were the days of no dormitories, and only a rich guy could afford a hotel or room in Boston, so we all travelled by train and walked six miles per day, rain or snow." I am sure many of '07 did the same thing. I know, for one, I did. . . . Late in November I received a very fine obituary notice for Robert B. Sosman '04, who died October 30, 1967. It seems that Mr. Sosman was one of three to receive a Ph.D. degree in 1907, the first such degrees granted by M.I.T. I still think '04 should claim Mr. Sosman as their member, and I sent the obituary notice to their Secretary.

The middle of November I received a note from Mrs. Herbert G. Spear from Berlin, N. H., telling of the death of Herb on Wednesday evening, October 18, 1967, and enclosing an obituary notice. I immediately wrote to her expressing the sympathy of the Class in her and our loss. Herb had apparently been in very good health, in fact, he played golf the afternoon of October 18. **Herbert Gay Spear** was born in Boston, January 29, 1885. He was one of a large number of '07 men who came to M.I.T. from Newton High School. At Tech he took Course X, Chemical Engineering, and did his thesis with **Roy Lindsay**. He was in the Tech Show in both his Freshman and Sophomore years. After graduation, he went directly to Berlin, N. H., as a chemist

for the Brown Company at the Burgess Mill. When he retired he was Assistant Superintendent of that mill. During his lifetime he was very active in the civic, religious, and fraternal affairs of Berlin. He was a member of Kiwanis, the Elks, the country club, the Masons and Treasurer of the Berlin Cooperative Bank. He was a member also of the Berlin Congregational Church. Surviving relatives include his wife, a married daughter, and one granddaughter. My records show he attended our 5th and 15th Reunions. Another '07 member whose influence for good was revealed in the community in which he lived. . . . I expect to get out a Class Letter early in January giving an accounting of my work as Treasurer for 1967 and asking for some financial help for 1968.—**Philip B. Walker**, Secretary and Treasurer, 18 Summit Street, Whitinsville, Mass; **Gardner S. Gould**, Assistant Secretary, 409 Highland Street, Newtonville, Mass.

09

On the electron ballot sent out during the summer the Class was requested to express a preference for the location of our 60th Reunion. It will be recalled that 20 voted for a dormitory on the M.I.T. campus; 13 voted for a location outside the campus but near M.I.T.; 18 were neutral. In view of this vote, **Art Shaw** and the Secretary have discussed the matter with Fred Lehmann's office. We are advised that we would be very welcome to use a dormitory and that lodging and breakfast would be gratis. A meeting room would be available at all times and arrangements can be readily made for luncheons, dinners, and other gatherings. This past year the Class of 1907 held its 60th with 18 men and seven wives and children, and the Class of 1912 held its 55th with 25 men and 12 wives and children. These two reunions were held at McCormack Hall, the women's dormitory. Both classes reported that they were much pleased with the arrangements. Your officers would be happy to receive comments or suggestions. . . . **Ben Pepper** writes as follows: "I thought it might be of interest to you to know that my grandson, Robert Pepper, is in the Class of '71 at M.I.T. He graduated from Exeter in 1966 and spent a year at Winchester College in England afterward. His father was in the Class of '42 at the Institute. After four years in the Navy, mostly at sea as a deck-engineer officer, he went with Arthur D. Little and has been there ever since. That makes three generations. Do you think we can keep it going?" The Pepper family is to be congratulated on having three generations at M.I.T.

We were saddened to learn of the death of **Haylett O'Neill**. Haylett celebrated his 82nd birthday in June, and he and his wife, Ethyl, had their 57th anniversary this past October. Haylett leaves two sons and five grandchildren.

... Along in November, Betty and **Art Shaw** left for their winter home at Longboat Key, Sarasota, Fla. Art writes: "We had an easy and uneventful trip south and are well settled here at the 'old stand.' I have paid my dues to the M.I.T. Club of S.W. Florida and expect to participate in some of the winter and spring meetings and activities. I am thinking about attending the M.I.T. Alumni Florida Festival on January 27. An ambitious program is planned. It will be held in Orlando which is about 150 miles from here. When the details come out, I will decide. The weather has been ideal so far. The Gulf here is upwards of 70 degrees and we take a dip regularly, sometimes twice a day. Best wishes to all." ... Art received a letter from Mrs. Edgar M. Post, San Carlos, Calif. who reports: "I have a communication from the M.I.T. Class of '09 received June 28 concerning the class Reunion and class dues. After a long and distressing illness my husband, **Edgar M. Post**, passed away June 27, 1967. I am enclosing a check for '67 dues, as I am sure he would want me to do ... Very shortly after his death I was called East by the sudden death of my son-in-law, and on returning to California recently found many affairs not attended to. Among them your letters." Our records show that Edgar was a member of Course I and that he had several addresses, most of which were in Pennsylvania. In 1959 he moved to Napa, Calif. Both Art and the Secretary have written to Mrs. Post thanking her for the contribution to the class dues and expressing the sympathy of the Class.

We have also received a notice from the Alumni Office of the death of **Derick Hartshorn, II**, which occurred on September 15 at Fort Meyers, Fla. He was born in 1883 in Dorchester, Mass., and prepared for the Institute at Boston English High School. He was a member of the Mechanical Engineering Society and performed his thesis, "An Investigation of the Initial Strains in Cast Iron" with **C. W. Kyle**. After retirement, he sent us occasional news items concerning himself and was generous in his contributions, but we have no records of his professional career. He has had several addresses including Pennsylvania, Springfield, Mass., New York and Florida.—**Chester L. Dawes**, Secretary, Pierce Hall, Harvard University, Cambridge, Mass. 02138; **George E. Wallis**, Assistant Secretary, Wenham, Mass. 01984

10

Notice has been received of the death of **George S. Humphrey** of Hagerstown, Md. ... Capt. **James O. Gawne**, U. S. N. writes, "I am still married to the same girl and have one daughter and four granddaughters. Christine graduated in 1967 from Carnegie Tech., Laura is at Smith College but in Geneva for this year, Sandra and Wendy are at the Masters School, Dobbs Ferry,

N. Y." ... **Herbert G. Reynolds** writes: "Nice to have had your note and sorry I don't have much to reply. I don't drive anymore nor does my wife so we are pretty well confined to home, but we are within walking distance of a grocery and some other stores. We have five great grandchildren, the last two of which are twin girls. We also have 11 grandchildren. Our oldest son lives near us, but the rest of the family is scattered throughout the country. We have sold our home and are living in a nice two bedroom apartment." ...

Fred T. Crossley writes: "Sorry for the delay. I have been away, the Berkshires, I have nothing of interest to report."

... **John G. Ahlers** writes: "I am still busy in my professional office when work comes in. The great Northwest still looks good. I'm handicapped by a little stiffness but cheery and bright; 80 years do not seem so hard." ...

Richard R. Taylor, Newtonville, Mass., simply signed his name to my reply card.

Robert P. Waller writes: "You have a hard row to hoe I know so will fill you in on an unexciting life as a space filler. I retired in 1960 at 76. Mrs. Waller and I spent that summer in Portugal and we toured Europe. Then we were in Florida for two winters and in September '65 moved to the Presbyterian Houses of the Synod of New Jersey at Meadow Lakes, Highstown, N.J., which is now our home and which we like very much. Last winter I was in the hospital for three months but am around now and gradually getting strong again. Sorry the news is not more interesting." ...

Percy A. Falkenberg writes "Due to moving to Newton Corner my reply was delayed." ... **John E. Barnard** writes: "All's well on Cape Cod. J. B. Jr. doing 90 per cent of the work so life is just easy for me. I confine myself to office work only." ...

F. Brewster Hooker writes: "I am living in retirement in my home on the shore of a small lake here (Interlachen, Florida). My wife died in 1959. For more than 20 years I worked on Wall Street, New York, most of the time with one of the large banks."

Charles F. Robinson writes: "I can realize that you find live classmates news hard to obtain. At our age many of us may not feel we have anything startling enough to write about, and are reluctant to record the day by day trivialities. Retirement for me does not mean the rocking chair. Having lived in this house for 51 years, I find plenty of chores to keep me busy as well as outside activities. Any spare time is usually spent on genealogy and philately. Anyone care to swap stamps?" ...

Hermann Behr writes: "Your inability to collect news of 1910 classmates is their fault, not yours, and I'm probably more to blame than any of the other 159. But I never was much of a socializer and its hard to reform at my age. I'm healthy, but lazy, like to do what I want, my own way, when I get good and ready, and I don't like L.B.J. My health is good, and maybe that's

why I have such a cussed disposition. Best regards to you and what's left of 1910." ... **Laurence T. Hemmenway** writes: "At 79 years I am quite normal for that age, but I sure lack strength and tire easily compared to my younger life. I take it very easy, and do not take any trips anymore. My wife died five years ago.—**Herbert S. Cleverdon**, Secretary, 120 Tremont Street, Boston, Mass. 02108

11

President **Howard Williams** writes that he is keeping well and on the job in his office from 7:30 to late afternoon every day. He also said "On Friday, November 10, Dr. Killion accompanied by Mr. Fulmar (a Vice President at the Institute) were here and we had a very pleasant luncheon at the Los Angeles Country Club. Dr. Killion was, as always, stimulating and interesting, and it was an extremely pleasant few hours we had together. I enjoyed his visit very much and found Mr. Fulmar, whom I had not met before, to be a very interesting man." ... From **Lloyd C. Cooley** "I go to business every day making 'takeoffs' of expansion joints, flexible connectors and all which are sold to heating contractors. Occasionally sell as small 100 to 250 lb. gas fired boiler." ... From **Livingston P. Ferris** "Still keeping busy trying to manage and preserve an old southern plantation." ... The only daughter of **Allston T. Cushing** died August 30 at the age of 44. Allston and his wife spent Christmas with their son Maj. Don A. Cushing in Colorado Springs. If you think the names of some classmates appear too frequently in these notes it is because I often hear from them or of them. I'd love to get some other names into the column. Write to Obie.—**Oberlin S. Clark**, 50 Leonard Rd., North Weymouth, Mass. 02191

12

Once again it's time to assemble the contributions received from our classmates. No contributions, no news! **Do you remember** the favorite remark of our old friend who taught applied mechanics, Professor Gaetano Lanza, who interjected frequently in his lectures, "Ain't that right, gentlemen?" A few years ago I found an old notebook where I had kept tally of the number of times he had made this remark. This showed 28 in an hour's lecture! ... This month we are fortunate to have a fine article from **Willis Salisbury** describing a trip he made last summer to the Iron Curtain countries and others, most of which was spent with a group of city planning officials. His observations regarding conditions in the Soviet Union are enlightening. "We first had a few days of sight-seeing in Copenhagen, Stockholm and Helsinki, including a visit by flying boat to Malmo, and also saw the *Wasa*, a warship sunk in Stockholm harbor in 1625 which

had just been salvaged. In Helsinki we saw the beautiful new city recently built on its outskirts, and were conducted through it by its planner. We envied the people who were able to live there. Then to Leningrad where we visited the Hermitage, so named by Catherine the Great as her winter palace. It now houses one of the greatest art collections in the world. The big department store is two blocks long and 2½ blocks wide. We marvelled at the big restoration job, repairing and restoring the extensive war damage in this city of 3½ million. From the airport in Moscow we passed for several blocks along the Kremlin walls before turning into Red Square. Our hotel, Hotel Russia of 3600 rooms, is probably the largest in the world. The Lenin Mausoleum was almost under our window as well as the pretty little onion-turreted church of St. Basil. I visited the big G.U.M. department store where some 200,000 people shop daily. Then I viewed some of the enormous housing developments. The planning seems to focus on the problem of the maximum number of people on the minimum ground area—huge 15-story apartments, two or three blocks long, with many wings, meager shopping and play areas. The university faces the 100,000 seat Olympic stadium. We toured their famous subway built in 1938 and marveled at the stations, two of which are of white marble with large statues and mosaics of great beauty. We enjoyed an evening at the Moscow Ballet.

Then we flew to East Berlin Airport and took a bus to East Berlin through the barriers at check point Rudower Caussee with three passport examinations. Then a nice ride through the shopping section of West Berlin. What a contrast between the two Berlins! One is cluttered with war damage behind the facade of repaired buildings on its main street; the other is almost fully rebuilt and sparkling. The one is peopled with dour faced, trudging, smileless beings; the other is teeming with happy busy people who have done an excellent job of rebuilding their beautiful city. We attended the meeting of the Congress of Planners in the lovely new Congress Hall. We then toured Potsdam and visited the hunting lodge of the nephew of Frederick the Great, called Ceciliahof, where the Potsdam Pact of 1945 was signed by Truman, Atlee and Stalin. The Mayor of Berlin received about 4000 of us at the Charlottenburg palace. After his speech of welcome in German, which I helped to translate, each shook his hand and thanked him for his hospitality. He thanked us in perfect English and then disappeared into the crowd! Two of us met the director of the Berlin Zoo who invited us to accompany him on his daily rounds to check the health of his animals. The next day we drove through check point Charlie and on to the beautiful city of Prague surrounded by a lovely countryside. By chance we met a university professor

who guardedly told us of the hatred of the young people for the Soviet Union and of their inability to organize any resistance. He thinks it will take at least two generations for them to build the necessary strength to start an overthrow of the present regime. We also talked with a physician who told us of his unfortunate position, working for the government on a very small salary, hardly enough to maintain a wife and one child. At the site of Lidice, utterly destroyed in the War, when the men were murdered and the children scattered, the former town is a huge bed of roses with a monument to the victims. A new village now houses the women, built by nearby neighbors. The doctor told us that our diplomatic corps has no contacts with the people. He greatly feared being seen talking to us.

Then we went on to gorgeous Budapest on the Danube! Traffic was tremendous. Eight beautiful rebuilt bridges span the river with large parks and restored buildings. We visited one park where boy and girl teen-age "Pioneers" operate a railroad and restaurant. Not a smile was on a single face, really pitiful and depressing. Then to famed Dubrovnik, now a favorite watering place of Americans as well as Europeans. This is the oldest free city in Europe, dating from the 10th century. An exciting bus trip took us up a fjord-like inlet to Kotor, Cetinje and St. Stefan. Now to turbulent Belgrade, 25 times destroyed. Nearing completion is Novi Belgrad where a city of 200,000 people already has been built on reclaimed swampy ground. This new city was completely planned from scratch. So now there are twin Belgrades, each with civic centers and public buildings. We met a young doctor who asked us to sit down in a secluded place to talk. He told a pitiful story of his work as head of a maternity ward in a large hospital which he asked us to visit with him. He said that his meager salary was more than half expended by the rent of a two bedroom apartment which he had to pay for his wife and one child. He was hoping somehow to get out of the country. We secured permission from the American Embassy where the young lady told us, "The people who come here officially do not ever see that side of the picture. They are led to believe that the people are happy with conditions." That is not so. Our trip to the hospital was most revealing and disheartening. Next, we found Bucharest a very beautiful city with its wide streets and trees, parks, gardens and public buildings. We also saw a novel outdoor museum with a restoration of a complete 18th century community typifying all the provinces in that period.

"I left the group here and took a tour of my own across Western Europe, stopping in Salzburg to visit the opera and the best marionette show in the world. After visits to old friends in Belgium I went to Heiloo, near Amsterdam, to visit with a boy whom I had met 10 years ago and

with whom I still correspond. He now teaches English in high school and has a home and family where I visited for three days. I had a scary and uncomfortable ride to a restaurant on a bicycle not "built for two," and the next day visited his school by motorcycle which was but slightly better. There I gave brief talks to three of his English classes, which was both exciting and rewarding. How I hated to leave, but after a visit to nearby Alkmaar, a very old town and the cheese market of Holland, I flew across the Channel to England, where I had lunch with old friends in the suburbs of London. What a nice way to say good-bye. I flew to New York the next morning. . . But the sad, forlorn and hopeless faces that I saw on the streets of every capitol of the Iron Curtain countries will haunt me as long as I live. I cannot forget the words of the Prague professor who said that it might take two generations to produce leaders who could throw off the yoke." Our commendations for a most interesting and revealing story.

The sad news of the passing of **Benjamin Towne** was forwarded by his brother-in-law, M. B. Doucette, '25. Although only with us for one semester, Ben was always proud of his association with the Institute. He was well-known in his home town of Topsfield, Mass., and became a state social worker in 1916 after graduation from De Pauw. The esteem with which he was held in Topsfield was marked by the flying of a flag at half-mast on the village green at his death last October. Our sympathy was extended to the family. . . . **Howard Cather** has contributed the following: "Although I graduated as a structural architect in Course IV-2, I left that work in 1914 due to the World War I depression and became a mechanical engineer at the Eastman Kodak Company, Power Division, at Kodak Park. I spent the War period as ground officer for the Air Force at Langley Field, Virginia. However, I spent most of my time flying and really enjoyed my stint. I then returned to my old job with Eastman. The Power Division is more like a fair-sized public utility plant in steam and electricity, and is especially remarkable for the large amount of refrigeration produced, ranging from minus 100°F. to plus 40°F. I did much pioneering in low temperature refrigeration which won me an A.S.M.E. Fellowship. Soon I became Superintendent in charge of the Utilities Division, a position I held until retirement in 1955. Many of the executives were M.I.T. men and I greatly enjoyed my work with such a wonderful organization. The big event in my life was my marriage to Elizabeth Shedd, Wellesley, 1921. Although we had no children, we do have many relatives in this vicinity who help to make up for this loss. I was Vice Chairman of the City Planning Commission for many years and served in various other civic activities such as housing. I also hold honorary life memberships in three engineering societies. At 81 my health is excellent and my doctor says I should make 100. I keep active about our home and still mow

the grass and "blow" the snow. I also have quite a woodworking shop in the basement. I belong to two groups of oldesters who play bridge, one of which consists of some 30 retired men known as the Kodak Park Superintendents Luncheon Club. We meet twice a month at a downtown club for lunch and bridge. My principal hobby is investments, and I recently won a prize in a contest based on percentage gains in lists of 25 stocks selected over a 6-month period. Elizabeth and I usually spend nearly two months each winter visiting such locations as Tobago, Barbados, Virgin Islands, Arizona, California and Florida with two other couples, this year the Bahamas. I regret that something always seems to upset our plans to attend Class Reunions, but I hope to make it next time. Best wishes to all members of the Class of 1912."

Harold Brackett deserves a medal for his immediate reply to my request for news. We recently told of his visit with **Jim Cook** to **Larry Cummings'** summer home in Maine, and of their fishing trip on Squam Lake. This was so enjoyable that Jim went up again for fall fly fishing with Harold near Mt. Katahdin at Sournahunk Lake, a most scenic spot. Harold writes, "After graduation I accepted a position with Bell Telephone Company, where I remained until retirement in 1954. I was first attached to the New York Telephone Company in Manhattan and transferred in 1925 to the Engineering Department of the New Jersey Bell in Newark, a very interesting and exciting 42 years. My niece, Miss Elinor Forbes, and I manage to keep fully occupied during the late fall and winter in Orasell, N. J., and usually enjoy a few weeks in Florida during the early spring. The rest of the time, however, we live in our summer home in Limerick, Maine, which has been in the family for several generations. In this way we enjoy the marvels of spring three times each year. We manage to get a great deal of exercise during the six-month period in Maine, gardening extensively, which includes vegetables, small fruits and flowers. Occasionally we fish for salmon, trout and bass, and I enjoy the surf fishing for stripe bass on the Maine Coast south of Portland. We also greatly enjoy hikes in the Maine woods as well as climbing the nearby mountains. I will conclude with very best wishes for good health and happiness from us both to you and Helen, as well as to our many friends in the class of 1912."

From **Ken Robinson** I have an interesting reply to my letter, written in a large hand on an unusual eight foot scroll which, necessarily, has been cut to size. "The first eight years after graduation I spent as instructor in mechanical engineering at M.I.T., at Lowell Institute, Army and Navy Ground Schools, Massachusetts Public Safety Schools, and Merchant Marine Engineering School, and between them I kept quite busy. In 1920 I decided to go into the trucking business, which was then highly competitive, each company setting his own price. I finally

decided this cut-throat business was not for me, and sold out without losing my hide. I then started a sales and service business for small ammonia refrigeration machines which did fairly well until the larger concerns began using sulphur dioxide machines, arranging extended financial setups, with which I could not compete. In 1919 you may recall I interviewed one R. E. Wilson for a position as fire protection engineer with the Factory Mutuals. This I accepted, and I continued with that organization until retirement. For the first four years I traveled about the country, mostly on five-week trips east of the Mississippi I saw much of the country and many large industrial plants but was glad when transferred to become resident engineer for the Pittsburgh District, where I was able to be home most of the time. On retirement in 1951 Alliene and I took an extended trip across the country and visited with my son, Dick, in Los Angeles. I soon joined the Plant Engineering Division of H. H. Robertson in Ambler, where I spent two years revising plant service operations. I intended then to retire but after some more trips I tired of puttering around, and accepted a job with a good friend working on the design and manufacture of rocket engines. This kept me busy for two years when I really retired. Since then Alliene and I have traveled to the West Coast several times and for 11 years have spent our summers at Lake Bonaparte, N. Y., and in New England which we still love. Unfortunately, we have no grandchildren, so my line of the Robinson family, direct from the Rev. John Robinson who gave the prayer of departure for the *Mayflower*, is running out. We are both in fairly good health and I am able to take care of most of the maintenance of my 90-year-old home, even to clearing the leaves from the gutters. I can only die once! With this happy thought I close, with best wishes to my many friends in the class of 1912." . . . This year we had a real snowstorm on November 30, something almost unknown to Philadelphia. So now we are skidding about the city waiting for warm enough weather to melt the ice from the roads. We are leaving next week to spend the holidays with my daughter and family in St. Louis and hope to find the mailbox full of your news contributions on our return.—**Ray Wilson**, Secretary, 304 Park Ave., Swarthmore, Pa. 19801; **Jay Pratt**, Assistant Secretary, 937 Fair Oaks Ave., Oak Park, Ill. 60302

14

We have finally succeeded in getting from **Harold Wilkins** a news item regarding a trip which he and Marian took last summer. To quote his note: "I stuck pretty close to work until my retirement but since then Marian and I have been travelling around a bit, usually in the fall when the weather is good and some of the tourists have gone home. We seem to head for the mountains,—Scandinavia one year, the next Alaska via Banff and Jasper and the inland water passage up the west coast of Canada and last year a

month in the Colorado Rockies. Our daughter Sally has been an enthusiastic field hockey player since her high school days and when she was designated as a member of the U. S. Field Hockey Team to take part in an international conference in Germany, it did not take much to get us started. We flew to Frankfurt and took a trip down the Rhine to Cologne. The games were played on the Bayer Aspirin Company fields just outside of the city. We were much impressed by the enthusiasm for sports and by the size and quality of the athletic facilities in Germany. The U.S. team did only fairly well among the 18 nations represented but it was a wonderful experience for the girls. After a few days of field hockey watching, we set off for the Swiss Alps by way of Heidelberg and the Black Forest. Five days in Lucerne were full of sight-seeing up Mt. Rigi on a cog railway, which was built right after the one up Mt. Washington had proved successful, and bus trips through the countryside, on the famous Axenstrasse and over the high Alpine passes. Berne was next with a trip up to the Jungfrauoch and visits by boat and train to castles and towns in that area. Zermatt and the Matterhorn on a beautiful fall week-end was one of the outstanding spots of the whole trip. With trips to the lakes of Lugano and Como we completed a most scenic and interesting visit of nearly a month in Switzerland. We had a couple days in Venice and then a beautiful bus trip through the Dolomites and the Brenner Pass to Innsbruck before leaving Europe. A flight home via Montreal gave us a chance to see Expo 67 and completed an outstanding trip of nearly six weeks. One other personal note—28 years ago my wife presented me with a son on my birthday. Last year our daughter-in-law gave us our first grandchild on, yes, the same date!" This is a



Leicester F. Hamilton, '14, was honored last fall when a new shell at M.I.T.'s Pierce Boathouse was named in honor of his long and productive association with crew at M.I.T. The picture shows him in the act of christening the new craft, with Mrs. Hamilton at his side.

trip that makes us envious. I think we should note that Marian is also an M.I.T. graduate, Class of 1931.

Speaking of trips, that peripatetic pilgrim **Alden Waitt** drops a note from San Francisco in November: "Kathryn and I are here celebrating our 50th anniversary so I guess I can call November 11 a magnificent date. This has been a busy year, two operations, a trip to Portugal, a month on Cape Cod, two weeks in Denver for granddaughter's wedding and week in San Francisco." . . . Here's a note from **Frank Atwood**: "I must apologize for not thanking you before this for the plug you gave our hotel in one of last year's *Reviews*. It is hard to say how much good it did for I had turned the management of the hotel over to one of our grandchildren. We apparently did not watch them close enough nor give them enough training, so I have had to get back on the job. Frankly, I never did feel very well taking life easy. And it is rather fun meeting the guests we have here. One such who has become neighborly this past year is Thornton Wilder and his sister. They bought one of our houses and spend some time here. Actually the Island is not a bad place to live. I note in the recent *Alumni Register* that we have a number of M.I.T. men here, some still active and some retired. Also Jim Killian visits the Island frequently. Jerome Weisner bought quite an estate here. As for the other colleges, the past two presidents of Yale have summered on the Island for many years, and Brewster still has a summer home here. One of our most frequent guests for the past eight years has been Professor Jakobson and his wife. He teaches semantics, linguistics and Russian literature at Harvard and Yale while his wife teaches Russian literature at M.I.T. Last winter he lectured in Italy for two months. Last summer they lectured in Tokyo and next September they will do the same in Brazil. So we have very few dull moments here. Hope you can visit us some time. If you fly down we have a number of tie-downs near our office. Kindest personal regards to you and your wife."

Here are four up-to-date addresses passed on by the Alumni Office: Arthur W. Johnson, Boca Verde, Apt. 606, 300 N. E. 20th St., Boca Raton, Fla. 33432; Ormonde C. Clisham, 173 Lund Rd., Nashua, N. H. 03060; Dr. Henry R. Aldrich, Tropical Apts., 4th Avenue South, Apt. 761, Naples, Fla. 33940; Egbert C. Hadley, P.O. Box 527, Middlebury, Vt. 05753. And just to wind up these notes with a bit of nostalgia, we read that Copley Square, the nearest thing we Boston Tech guys had to a campus, is about to be adorned by a 60 story insurance company building. Thus does the world move on.—**Herman A. Affel**, Secretary, Rome, Maine. Mail: RFD 2, Oakland, Maine 04963

15

It's sad to report the loss of another

outstanding classmate. After a long illness of emphysema **Gabe Hilton** passed away in Clearwater, Fla. on November 12. We have lost a fine old friend and a generous and active supporter of Class and Alumni activities. Born in Oshkosh, Wis., Gabe prepared at Exeter Academy, and took Course III with us. A member of Phi Gamma Delta, he was a very active undergraduate, being a member of the Beaver and the Walker Clubs. He was our Freshman President, Technique Societies Editor, and Technology Monthly Business Manager as well as serving on the Technique Electoral Committee and our Senior Class Day Committee. With **Bob Schmucker** he did a thesis on "Treatment of a Complex Sulfide Ore." In the first World War, Gabe was a 2d lieutenant in the field artillery and served in Germany. He later was in the automobile industry in Detroit and Buffalo, retiring to Florida in 1957. Gabe is survived by his widow, Theresa; a daughter, Mrs. Muriel Elliott of Daytona Beach; and a sister, Mrs. Marie Hay of Oshkosh. In my travels in business and later, I saw a good deal of Gabe and Tess in Detroit, Buffalo and Clearwater, and always enjoyed a gay and pleasant visit with them. The Class sent expressions of our deep and sincere sympathy to Gabe's family. We'll always remember him as a true, loyal and devoted friend. . . . With his annual Christmas poem, **Phil Alger** wrote that his oldest daughter, Kate Pierce, is a student at Newnham College, Cambridge, England under a Harvard Fellowship; his next oldest, Charlotte Pierce, is a Radcliffe Sophomore; and Louisa Alger is planning on attending Radcliffe in 3 years. So Phil and Helen will have good reason to see us on their visits to Cambridge.

In the Grayslake, Ill., *Times* of November 23, bold black head-lines announced "Extra! Extra! Marriage of Century" to describe the 50th wedding anniversary of Mr. & Mrs. **Verne Kennedy**. . . . On a colored postcard showing a cluster of straw thatched shanties resting on wooden piles over some dirty water, **Ernie Loveland** wrote "I am working on seaweed research in the Philippines, much of the time at Zambuang, but travelling all over the Philippine coast to villages such as shown on this card. Even here I have read in the papers about the Red Sox and the World Series. Thank you for your letter. I agree with you that the Beach at Waikiki is now far from an Island Paradise. I work seven days a week, finishing my reports about 10 o'clock each night. Regards to all Classmates." I give up on him, but at least he's settled in one spot after his nomadic wanderings out there. . . . **Jim Tobey** has gone down to West Palm Beach to suffer through another winter. He suggests I use some class dues to go down to see him. Ah, me, what a guy! . . . **Ben Neal** and his daughter Barbara just missed seeing Jim down there at Thanksgiving time. Jim is at 309 Conniston Road, West Palm Beach and would welcome any classmates down there in the sunshine. I have been enjoying a pleasant and interesting correspondence with Harold

Dodge, the hard working Secretary of that fine old Class of 1916. We share the same feelings on the preparation, handling and publication of our Class Notes and other Alumni Association Activities. When you are reading these notes, it will be only another 4 to 6 weeks until Spring, but it seems a long time right now—December 5th. Help, help! for notes for our column.—**Azel W. Mack**, Class Secretary, 100 Memorial Drive, Cambridge, Mass. 02142

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Headlines: Earthquake in Venezuela—Bottle afloat finds pen-pal—McArthur returns—Can M.I.T. solve health problem?—Malaria mosquito gives up! These are some of the items covered in this month's column. . . . As we write (December 4), we have not heard whether President **Ralph Fletcher** has gone, is just going, or will soon be going skiing on the slopes in New Hampshire, Quebec or Davos, but you can depend on it—we'll have something to report in the next issue when he announces the details about the 52d Reunion in June. . . . Combined business and pleasure took **Joe Barker** and Mary to Yosemite Park in November—a business meeting of Research Corporation's Grants Advisory Committee. Joe writes: "We reviewed some hundred applications for support of research projects in the colleges and universities and recommended grants totalling half a million dollars. We 'worked' mornings, 'played sight-seeing' afternoons and had 'bull sessions' evenings. Always these meetings are great fun and are stimulating in seeing what areas of fundamental research are being undertaken. After the Reunion last June our son, Capt. John Barker U.S.A.F., home on 30-day leave from Viet Nam, visited us with his two children. He had been stationed at Dong Ha as Maintenance Officer of that big Headquarters Base and had hair-raising stories of the heavy fighting in that northeast corner just below the Demilitarized Zone. He had volunteered for an extra year of duty in Viet Nam, so about August 1st he flew back. On November 1st he was transferred to 7th Air Force Headquarters in Saigon and supervises the maintenance units in that command,"

Art Shuey tells why he didn't make the party at Vert and Sylvia's Bogalusa plantation in September: "Sorry to have missed your Louisiana visit but I had already engaged quarters for a trout trip up Crystal River at Marble, Colo. Had such good fishing that a son, a dentist friend and I went back by auto two weeks later. No need to tell you of the wonderful summer trip with Sylvia and Vertrees, for I am sure you have had a full report from them." . . . Speaking of Louisiana, we asked **Everett Johnson** of Monroe, La. about his settling in the South and this is what we find. His course was "old Course VII", Biology and Public Health. He had studied malaria and its control, liked it, went South after we entered World War I, and decided to stay. For over

30 years he had charge of field work in studying and controlling insects affecting public health for the Louisiana State Board of Health. He says he has been pretty busy this year, particularly taking care of the garden, trees, shrubs, and all. "Things grow so fast here that when they are as old as ours (have lived on this place over 39 years) it's quite a job keeping them under control! That and my singing have kept me too busy to be lonely; I'm half way through my 58th year of singing in church choirs." Everett mentions that his daughter and family have just moved into a new home, "and it is interesting that they incorporated a lot of Cape Cod into their new house though none of them have ever seen Cape Cod!" Then: "Louisiana particularly is having a remarkable growth, and I am sure there's a great field here open to M.I.T. men, and I know they'll find as fine people as could be found anywhere in the world."

And now that the subject of malaria has come up, we have interesting related words from **Joel Connolly** of Tucson, who spent years on public health and water problems in Taiwan. A little over two years ago, he tossed a note in a bottle overboard at the equator between Samoa and Hawaii. "Now," he says, "I have just received a second note from the finder of the note in the bottle. He writes that in his area, Rabaul, New Britain, in the S. W. Pacific Ocean [see your atlas; Sec.], malaria has nearly been eradicated. In Taiwan (Formosa), where I at one time participated in malaria eradication work, the World Health Organization has investigated and pronounced the island to be malaria free. Only a few years ago, as many as 1200 Taiwanese died of malaria annually and a million suffered from the disease every year." Then Joel obligingly comments thus on some of the items in our routine letter: What doing: "Living the life of enjoyment in the fascinating Cape Cod environment until a month ago, and now here in Arizona." Where been: "Visiting friends and relatives in Holbrook, Ariz.; Ouray, Colo.; Junction City and El Dorado, Kansas; Kansas City, Mo.; Lafayette, Ind.; Rocky River, Ohio; Voorheesville, N. Y.; and numerous places in New England." Bit of philosophy: "Whether anatomy is close enough to philosophy to fit here we do not know. However, here goes! Anatomy: God gave man two ears but only one mouth. Philosophy: Therefore we should listen twice as much as we talk!" As he wrote (mid-November), Joel, who has continued active in Rotary, was about to take off for Magdalena, Mexico with a group of Rotarians.

Your two privileged secretaries are circulating two sets of fascinating Sixteener travel letters—one set by our Sylvia (Mrs. Vertrees Young), covering a sort of safari around and over South America, and the second set by **Irv McDaniel** covering his and Kay's trip to the Pacific Islands and Indonesia last spring. If you are not on either of the two circulation lists and would like to be included, write

one of us. Let us give a sample of the first set. Sylvia and **Vertrees Young** and their party of four, including Art Shuey and Dr. Fred Ratzburg, both of Shreveport, ran into a number of unexpected things on their South American safari, including an earthquake in Venezuela, while at anchor near the port of La Guaira. Hear how Sylvia reports some of it: "While we slept peacefully on a calm sea, an earthquake was taking heavy toll on land. When we docked in the morning, all electric clocks in port—in Caracas, in Curafalente, Los Caracas, La Gualira—had stopped at five minutes after 8:00 P.M. Saturday night, and countless injured and dead were still uncounted and uncovered. The beautiful hotel on the beach—the Sheraton Macuto—had its thousands of windows broken, its water lines broken, its entire structure shaken as if it were just a toy; and a nine-storied apartment house near the hotel lay smashed down, as though a giant had stepped on a mushroom—smashed so that only four floors remained countable, the roof and the other five floors a mass of rubble! And underneath hundreds of families that, even today, two days later, still have not been uncovered, though work has not ceased since that first terrible hour of organizing! We drove over to the beach to see the damage and the wonderful beach drive and the great rocks in the sea where the blue water dashed over them and rolled onto the shore, where tropical flowers and trees grow in great profusion and where great, narrow, tall apartment houses are springing up like weeds everywhere. Their presence fills one with a sense of horror, especially after seeing several that in the 'twinkling of an eye' had collapsed, burying treasures and people—countless people. Such contrasts of seeming perfection of living and desolation of destruction! I took my Red Cross cap with me, on which is pinned my 45 years of service pin and my 50th year of service pin and my Red Cross pin; and was courteously allowed to have the car we were in, enter the roped-off areas and could walk up to

the devastated area, where we could see the horrible destruction. We did not go too far. Men were working desperately and there was nothing we could do. One can never be quite the same after experiencing the sights and sounds of this trip!"

Next, here's a bit of a most interesting letter from **Dave Patten** to Irv McDaniel, commenting on some of the things Irv and Kay found in the Philippine Islands: "If your memory had faded somewhat upon returning to the Philippines after 38 years, as your interesting letter of April 19 records, I can truthfully state that my own recollections after 22 years have receded into the background. The Walled City stands out vividly because of the stray Japs holed up in the ruins who took pot shots at us for several months after the occupation of Manila. Of course the old brewery had been kept up by the enemy, and was off target for the U. S. Forces, so the ice making plant was operative. The old Army and Navy Club was a shambles, quite beyond repair and another favorite enemy hideout. I remember these two or three spots well. When the G.H.Q. Officers Club was formed, shortly after establishing ourselves in the ruins, I was elected as the one to start the Club off with supplies from the Navy and ice from the brewery. Bamboo furniture was made from fresh cut stalks which could be bent into any shape with a blow torch, and best of all, when the Navy pleaded a paucity of supply, the old brewery yielded a great quantity of artificial flavoring. Alcohol was no problem with plenty of sugar cane available. It was my privilege to attend the reconvening of the Philippine Legislature with Quezon presiding and General McArthur as the great liberator and hero making the historic speech: 'I have returned—our blood has flowed with your blood—and the ties that bind us shall last forever.' He wept and so did most everyone else. For some reason I was included in the list of decorations when the General held this ceremony soon after establishment of his Head-



In November 1967, Henry Shepard, '16, antique car specialist, and his wife Francis drove from New London, N. H., to West Newton, Mass., in just under three hours. The car is a 1913 Chalmers Pony.

quarters in Manila. I like particularly that part of the citation that mentions, to quote: "In addition, he initiated various projects involving coordination and rehabilitation of civilian activities in connection with military operations." It is sad to read today that graft, bribery and great unrest prevail in the Islands. We set a poor example in our own land. I think this stems from the inability of homo sapiens to keep pace with the over-powering and fantastic strides of science, which in this atomic age has brought a very real threat to existence itself. To believe that there is any validity beyond the findings of science is fashionable under the stress of this era. The search for material answers has relegated things of the spirit into the background, and new found freedoms the world over have intoxicated mankind with the heady and dangerous thing called license."

Dan Comiskey reports the successful outcome of cataract operations. He sends a clipping from the Boston *Herald Traveler* with its offer of a number of front pages of noteworthy dates and events. Undoubtedly the front page for May 6, 1961 is one that Frances and **Henry Shepard** have sent for, since it covers "Shepard in Space Flight" and is about their astronaut nephew. Dan also sends an editorial from the November 18 issue of the same paper, on the topic: "Depolarization at Harvard, M.I.T." He writes that "in 1914-1916, Harvard and Tech attempted to work together—now it is a different project! Shades of 1914-16 in reverse!" The editorial points out that: "Charles P. Snow caused a stir in Britain in 1959 when he published 'The Two Cultures and the Scientific Revolution.' The fuss has died down but the problem remains. As Sir Charles saw it, 'the intellectual life of the whole of western society is increasingly being split into two polar groups.' At the one pole are the literary intellectuals; at the other, scientists. . . The two cultures, he found, 'have almost ceased to communicate at all.' He saw the literary men (having claimed exclusive rights to the title 'intellectuals') chuckling at news of scientists who had never read a major work of English literature. Yet they themselves could not describe the Second Law of Thermodynamics, the scientific equivalent of a work of Shakespeare. And few of these educated men could define 'mass' or 'acceleration,' the scientific equivalent of reading. Locally and presently, Harvard and M.I.T. have acknowledged the dangers pointed out by Sir Charles. It would be unfair to M.I.T. and Harvard to say either university was dominated by one of these cultures. Yet last week both schools pledged themselves to depolarization."

Dina Coleman continues his active participation in the affairs of both Transylvania College and the Philharmonic in Lexington, Ky. Says they are still "upgrading the curriculum at Transylvania in an effort to survive the shock of the Junior College movement. Regardless of the prophets of doom, we believe

that a small liberal arts college offering a strong curriculum, well handled by a good faculty, will always find parents who are willing to pay the higher cost. The Philharmonic is still growing in size and quality. We have to give concerts in pairs because our hall is not large enough (1050 seats) for the demand. Last season we played five concerts in Appalachia. Thirty per cent of the audiences had never seen nor heard a Symphony Concert. While they may want bread, we give'em cake." And then we have what we might call a "Dinagram," as he writes: "The children and their children are attending to their own businesses, without any demands on us. How lucky can we be?" . . . Things go along about the same with **Barney Gordon**, still engrossed in business—apparently, this is his formula, says Ruth, for keeping young, happy and singing. They continue to find their greatest pleasure in watching their seven grandsons and their little granddaughter growing up. Two grandsons are in Harvard, and all seem to be very talented musically. They have been studying music since they were five years old. We assume of course that Barney has taught them all to sing "Old Man River" the way he sings it at reunions! We understand some of the boys love to corner their grandfather and quiz him on science, math or physics, and then say aside one to the other, "He'll never get that answer," but then up comes the answer and we hear it is always the right answer! Due in part no doubt to the techniques of Woods and Bailey, Charlie Cross, Talbot, Noyes and Walker back in the olden days. . . **Jack Burbank**, as Chairman of the Planning Board of the Town of Barnstable, is busy, busy on maps and articles for the annual town meeting next March. He is ex-officio on the Traffic Committee and on the Town Centre Committee for Hyannis, and is also a member of the executive committee of the Precinct Six Civic Association. Doesn't sound like much time in the rocking chair! He notes: "With towns on each side of us going for small lots development, we are upgrading large areas this year from 20,000 square feet to one acre. Green areas and conservation areas are very popular in our town just now."

From the warm comfortable sounding Sun City of Arizona comes word from **George Waymouth** who explains why he left New England: "I had to leave New Hampshire on account of my health (arthritis), to settle where it is warmer and dryer. I might suggest that if M.I.T. has anything to say in the formation of the new man, why not provide him with a set of alemitic grease cups in his spine and elsewhere if necessary, or even an automatic system of internal lubrication? Since I saw you last at the famed 50th (long to be remembered) I have done quite a bit of transcontinental driving, visiting our children in Cincinnati and Berkeley, enjoying our grandchildren, now eight in number. Dorothy and I have been rummaging around Yosemite, Mount Zion, the Grand Canyon (capital letters), up

and down the Appalachians and a host of other places. We then decided to settle down in this valley of the sun where we seem to be able to walk about without creaking quite so loudly. Keep well, and as the Spanish say *Hasta la Vista!*" . . . From Whittier, Calif., we received an invitation to the Golden Wedding Anniversary Dinner of Mr. and Mrs. **Robert M. Kallejian** held in the William Penn Hotel on November 12. With the invitation came some reminiscences including: "Now 77 years old; entitled to be called an old man; seems I have seen everything that is worth while; had 62 straight years in the drug business; graduated from the Massachusetts College of Pharmacy in 1913, then at Tech until 1916; chose to be a druggist rather than an engineer; am retired and waiting for the good Lord to take me." Robert is a writer for magazines and newspapers. He works through an agent in Boston who sends out his material to about 175 newspapers throughout the country. He sent us a copy of one 1961 article, "The Beauty and Heritage of Old Age," for which he received 2,300 letters of commendation. This we will have posted on the bulletin board at the 52nd reunion in June.

Reminded by the Golden Wedding picture of the McDaniels in the November issue, **Ken Sully** wrote that he and Emerald were honored to be included in Irv and Kay's Golden Wedding Anniversary party in Newport Beach in July. Then: "Our voyage over to the Islands on the S. S. *Lurline* and back on United Airlines was most enjoyable. We especially liked Maui and were fortunate in having good visibility on the trip to the top of Haleakala. We're planning a visit to Palm Springs and will be with friends and relatives in San Francisco for Christmas." . . . **Allen Giles** retired from his position as Chief Engineer of Longwood Towers just a year ago and is doing a bit of consulting instead. Says this doesn't place as many demands on his time—now he can take some family trips that had been precluded before by job priority. "My daughter, Dorothy, is preparing her final work on her Doctorate at Harvard, and her three daughters are all undergraduates at Windsor School, Boston—the oldest, Christine, is headed for Radcliffe next fall. Our son, Allen, is music director of the Villa Maria College of Music at Buffalo, and his three daughters are all in Buffalo schools looking forward to attending the University of Buffalo. A bit of philosophy, as requested: Retirement gives one the opportunity to get much better acquainted with family, wife, children and grandchildren; a change of pace to review all phases of living which the busy routine of a daily job does not permit." . . . **Theron Curtis** reports from Barrington, R.I.: "Can't give you much of interest about the Curtis's. Usual routine chores of parents and great grandparents, you know. Spent the long rotten summer on the Cape. Too busy mowing grass to get to your 51st. I don't see any Tech men. Losses of Steve Brophy, Harold Gray and Bob Crosby were a great shock to all of us. I have neared the stage, I

guess, where a bit of philosophy is hard to come by. We just try to enjoy each day, hope for the best, and let the rest of the world go by."

Don Webster, saying he can't let us down entirely, writes from the Cape: "The only newsworthy change here is for the address book. After renting here since retirement in 1959, we have bought a house near the main village where our friends are. From about December 15 our address will be: 12 Turtle Pond Rd., Falmouth, Mass. 02540. Family count is temporarily static, viz., two grandparents (we), four sons and four daughters-in-law, 11 grandchildren, nine boys and 2 girls. As I think deeply on many subjects, most of which thinking may be described as mulling of ruminating, I ought to have a bit of philosophy for you, but I'm out of stock at the moment. I could dig you up an aphorism or two but they would be trite. We hope to put in the late winter months again in our favorite Palma de Mallorca, Balears, Espana. You and I should do a comic and straight man act as Stone and Webster, Inc." . . . **Val Ellicott** of Baltimore and his wife enjoyed a three-month pleasure trip to Scandinavia and the British Isles from mid-May to August. He notes "In England, Scotland and Wales, our son, Le Moyne, and his wife drove us several thousand miles through all sorts of interesting lanes and by-ways, keeping diligently on the left side of the road."

Howard Hands, by now a confirmed Floridain, or Clearwaterite, writes of a hot summer but a pleasant one—never before so many grapefruit on his tree. In mid-November he noted that the tourist season had started and it looked as though it would be a big one again." . . . Also, down that-a-way, **Frank Ross** says: "Doing nothing exciting particularly—just taking life easy here in Naples, Fla." . . . We are glad to hear that **Dick Berger** has recovered from his 1965 automobile accident sufficiently to get off and away for some traveling, "trips to Miami Beach and one short tour to London and Paris." He expects now to get back to his avocation—writing on cancer prevention, "long overdue," as he says.



Back in 1914, as then photographed by *The Tech* reporter Francis E. Stern, '16, someone drew this picture on a classroom blackboard when "Mr. Smith" gave Tech his first \$2.5 million.

And so we come to the end of the chapter. We appreciate the apparently-willing responses to our requests for news, humor and philosophy. Again we urge that you keep open June 7-9 for the 52nd Reunion, and June 10 for Alumni Day, and that you keep writing a little but writing often to—**Harold F. Dodge**, Secretary, 96 Briarcliff Road, Mountain Lakes, N. J. 07046; and to **Leonard Stone**, Assistant Secretary, 34-16 85th Street, Jackson Heights, N. Y. 11372

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Dix Proctor and Vi are off on another of their globe-circling cargo ship trips, so your Assistant Secretary takes over. It was in 1954 that they started this sort of tripping. Now they are aboard the *M.V. Neder Eems* and are due back in April. . . . The Reunion News Extra has been mailed to everyone on the class mailing list and also to widows. If additional copies of the Extra are wanted your Assistant Secretary will be glad to send them upon request. . . . The fine response of the Class to the Alumni Fund for last year resulted in Certificates of Appreciation being awarded to Class agents **Ray Brooks** and **Stan Dunn** for their work, but of course it is all of you who deserve the credit. Incidentally have you sent along your contribution for this year? . . . If you have not read it already you will be interested to know that our Honorary Member **Horace Ford** has been honored by the naming of an M.I.T. building for him. It is the modernized Daggett Building on Main Street that houses our Alumni Association. . . . We wonder if **Bill Eddy** is going to begin to take it easy for, according to the *Wall Street Journal*, he has sold Metcalf and Eddy Inc., to Bangor Punta Corporation.

Some men dabble at a retirement hobby, some have a collection of hobbies, some mix hobby and continued job activity but not **Alan P. Sullivan**. He started an active interest in clocks in 1941 and by 1947 he had acquired a large collection, professional skills and a reputation among clock connoisseurs. A.P.'s own collection is spread throughout his house. His set of Seth Thomas clocks in oak, mahogany, maple and cherry are lined up together in his main basement room. One of the several calendar clocks is in the guest room, it names the day, gives the date and the accurate time. The watchman's clock is of course in the bath room, and the early type time clock can be punched in the central work shop room. It has a roll of paper rather than the cards, so many workmen have punched. Chronometers, the seaman's ultimate in clocks, are of English, French, German, Swiss and American make. They include masterpieces of the art, special types and a variety of war-time approximations. A scout on duty in Europe supplements the collection from time to time with unusual finds. Twelve o'clock in the Sullivan home is a combination of the Bell's of St. Mary, Big Ben and Stravin-

sky's Fire Bird Suite. There are Westminster chimes, other chimes, and gongs producing wide variety of tone and volume. They start a minute or so before the chronometer hour and continue for several minutes afterward. Then the ticking can be heard again, a restful but all-pervading flock of ticks and tocks. A. P. has a total personal collection of well over a hundred and fifty clocks, supplemented by a considerable number of individual ones in for first aid, or even a collection placed with him for skilled care. Incidentally, since he started he has repaired, remade or even completely constructed a total of some 500 clocks. He has repaired and reconditioned clocks for such V.I.P.'s as **Dudley Edward Bell** of Bristol, Pennsylvania, **John Aleck Lunn**, **William B. Hunter** and scores of others across the country. The famous Cape Cod antique craftsman, **Water C. Gartner** sends his special clock problems to Scotch Plains from his "Barncrafters" shop at Wellfleet. A wealthy California clock collector, acting through his agent commissions the purchase and reconditioning of any particularly desired museum piece.

All this requires equipment as well as skill. So the Sullivan basement is divided into five distinct rooms. (Olive is allowed one small area.) The main inspection room houses the special radio constructed by A. P. some years ago for taking time signals sent out by the observatory in Montreal. There are benches for adjustment and observation and the book cases for the horological library. At this point the chronometers are checked against observatory time. One chronometer had not varied a second in many days. Others have a known variation, and all under test are carefully recorded at least once a day. It is here, believe it or not, that a cot makes it possible for the horologist to sleep with his clocks on occasion, and he frequently works with them into the wee small hours of the morning. The metal work-shop is next in line, with its South Bend precision lathe, milling attachment and special jigs and fixtures. A. P.'s preschool training included a full tool-maker's apprenticeship, so he takes making his own gear cutters in stride. Replacement bearings, gears and parts in brass, wood, special steels and teflon are normal routine. Constructing a complete wooden works clock is not so routine but is done. The wood working shop is in the far corner, with a 10 inch diameter, flexible duct pulling dust from whatever area is busy, and blowing out the dust to fertilize the arboretum wife Olive is developing in the yard. Old and brittle woods and delicate veneers and carvings are revamped to better than new conditions.

The most fascinating area is the "white room", carefully sealed from contamination by dust from the other work rooms, and housing the jewelers lathe, the stock of bearing jewels (ruby and sapphire mostly) and the special

fixtures for fine assembly and repair work. Special diamond dust impregnated discs grind the jewels to shape and size. Records are kept on every clock that comes into the shop, with meticulous designs for constructions not previously recorded, designs made before the works are disassembled as a guide to reconstruction. Reference books supplement the individual records. Novel escapements and variations call for special attention. Each of the half thousand clocks has its page or pages of finely written and illustrated diagnosis and treatment. Each has its reference number. Olive Sullivan plants trees: coffee trees, olive trees of course, willows, pines, maples and varieties indigenous and not indigenous and fills in the limited non tree growing area with gardens that keep her busy while her horologist husband cuts gears and grinds jewels. Some one should order a special clock to be inspected say at Banff so Olive could have the trip out from the clock factory.

As we have said, A. P. Sullivan does not dabble with his retirement hobby.

Believe it or not, M.I.T. still receives returns from a bequest made to it in 1870. Deferred giving will become of more and more importance to the Institute. Some 30 men from the Class of '17 have already made such provisions.

Mail has been returned marked "deceased" from **Guy A. Gray** and **William W. Cargill** but we have no details.

New addresses have been received for Phil Cristal, 522 N. River St., Manchester, N.H. 03104; Charles A. Abels, Groton House, Apt. 6, 60 Washington Park Dr., Andover, Mass. 01810; Kenneth M. Lane, 8360 S.W. 148th Drive, Miami, Fla. 33158.—**C. Dix Proctor**, Secretary, Box 336, Lincoln Park, N.J. 07035; **Stanley C. Dunning**, Assistant Secretary, 6 Jason St., Arlington, Mass. 02174

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50th Reunion; Wianno Club, Osterville; June 7-10, 1968; for reservations: John W. Kilduff, P.O. Box 33, Amesbury, Mass.

It is memory which gives us both our sense of gain and of loss. It is another reason why there is something special between college classmates. Marion and **Harold Weber** (Mason, N. H.) have recently been guests at our house, with the steps of recollections concerning old colleagues resounding in the half-dark afternoon. We agreed that Julius Stratton was one of the best presidents M.I.T. has had since Richard MacLaurin. We talked about our coming Reunion and receding hair lines (with plenty of each of ours still left to comb). There were calm words on the hot subject of thermodynamics. Of course we referred to the fact that it is impossible to build

a self-contained machine, the sole net result of whose operation is the transfer of heat from a lower to a higher level. Being a good teacher, Harold said it far more simply. "Heat, of its own accord, will not flow uphill." That's the second law. Remember the first one? The total energy of the universe is a constant. In our conversation were the ever alternating rhythms of joy and pain concerning old colleagues. As a young instructor, Harold had attended visiting Professor Debeye's lectures on the Debeye-Huckel theory of solutions. The theory was so subtly derived from the unexplored reaches of grey emptiness that Harold understood neither the mathematics nor the philosophy. Years later Harold ran into Debeye again. "I have concluded," he told the famous co-author of a theory, "that of all the people who attended those lectures only two understood what it was all about—you and Norbert Wiener. He asked a few questions." "Hump," Debeye replied, "Only I understood. Wiener was just showing off." One of the best thunder-claps of laughter heard during our afternoon together occurred with Harold referred to Norbert's comment concerning the obvious intended purpose of the final structure represented by the gas-tank-like model of the still-to-be-built M.I.T. chapel. If you want to know what he said: (1) write me a good letter for this column; (2) ask either of us at Reunion; (3) forget it.

From faithful **Sherm MacGregor** (11029 51st Ave., St. Petersburg, Fla.) comes the following: "A few months ago I got a letter from a man living just outside of Brockton. He said he was a graduate of M.I.T., and that he had recently been looking through his latest copy of the *Review*. He had no reason to have been reading 1918 news, but he was, and the name MacGregor stood out in heavy type. He had been at the Brockton High School in 1897 and had been impressed by a young teacher with that name who, believe it or not, had a Ph.D! He wondered whether I was a son. I was indeed a son and was interested to have heard from someone who knew my father in the old days. Shortly thereafter I got a reply from him enclosing a snapshot of Father when he first went to Brockton. It was a photo I would never have recognized. But on the back of the picture was a note identifying it as Dr. A. C. MacGregor, taken just outside the school. My correspondent had bought an old desk at an auction. On going through it he came across the picture. The desk had been the property of Anna Mae Beal, a teacher friend of my father's. I remember her vaguely. Then, as though this were not coincidence enough, my correspondent, who is Chester Shaw, M.I.T. 1905, VI, told me that during the winter months he lives here in St. Petersburg with his wife, and not over a couple of miles from where I live! You may well believe that I looked him up. That story is full of coincidences too. When my wife and I called on the Shaws, he was out and we didn't see him. Meanwhile, friends of ours from Brockton, named

Shaw, called on us but we were not at home either." That's the way life runs at full throttle. . . . An unidentified newspaper clipping concerning the John Ward house, now located in the gardens of the Essex Institute of Salem, reports **Sam Chamberlain** as having said in his book, *Salem Interiors*, that it is one of the rare houses with both an "overhang" and Elizabethan gables. Sam's memory for details is showing again. . . . From **Philip Craighead** (20445 Veriner Road, Grosse Pointe, Michigan 48236) comes report of **Stephen Hoyer**, XV, (22085 Hayes Ave. E., Detroit) whom he anticipates will be at Reunion to gain another chance to reminisce and to have a look at the partly submerged contours of the past. Phil will be there too. He tried to locate **Stuart Caldwell**, whose address is given in the 1967 Alumni Register as 18853 Bretton Drive, Detroit, but Stu, in a move which seems to have been recent and sudden, has disappeared. Anybody remember seeing him lately? . . . Course XIII men, as well as others, will recall **H. Loring Wirt** of 804 Wright Ave., Schenectady. He sure pulled his weight on the tug-of-war team and the varsity crew as well as throwing it around some on the varsity wrestling team. A short note from his wife reminds us that he is in the Veteran's Administration Hospital at Albany with cerebral arteriosclerosis. She particularly asks that we send him picture postcards.—**F. Alexander Magoun**, Secretary, Jaffrey, N. H. 03452

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Our beloved classmate **Scoop Mosscoop** has gone from us. Scoop (Roger G.) had long been a resident of Manchester, N.H., and previous to retirement was executive vice president of the Public Service Company of New Hampshire. A veteran of World War I he was a member of the Military Order of the Loyal Legion of the United States. This career with Public Service covered 40 years, starting as director of public relations, and later becoming vice president in charge of operations. He had been a director of the Amoskeag Trust Company, the Amoskeag National Bank and the New England Council on which he had also served as state chairman. He leaves his widow, a daughter and three grandsons. A distinguished, highly popular and much admired member of our Class, Scoop will be sorely missed. His memory will live with us always. He made his home at 1170 Union Street, Manchester.

Word has also been received of the death of **Henry L. Nash** of 761 John Ringling Blvd., Sarasota, Fla. He is survived by his wife. No further information is yet available. . . . I have also learned of the death of **George Hanson** of 789 Dunloe Ave., Ottawa, Ontario. He is survived by his wife, Agnes. . . . **George Wilson** who lives at 38 Worthington Circle, Braintree, Mass., writes that as a retired high school principal he devotes his spare time to minerology,

ornithology and oil painting. His son George, Jr., M.I.T., '44, is with the Raytheon Company. He has provided his father with a grandson and a granddaughter. George, Sr., has a daughter Virginia who has contributed three grandsons. George says he would be pleased to correspond with other mineral collectors.

Marion Sanders, the squire of Wytheville, Va., is a director of the First National Farmers' Branch Bank of the First National Exchange Bank of Virginia, and has been for 30 years. He was elected to a directorship of the parent bank when the Farmers' Branch was acquired. Marion, who admits that he is semi-retired from his consulting electrical engineering business, is a member of the Shenandoah Club of Roanoke and is President of the Wytheville Golf Club. . . . **Bat Thresher** is Vice Chairman of the Commission on Tests of the College Entrance Examination Board. He is the author of *College Admissions and the Public Interest* issued by the New York College Entrance Examination Board. . . . **C. Richard Soderberg**, Institute Professor Emeritus, has been awarded honorary membership in the American Society of Mechanical Engineers.

Your Secretary had the pleasure of running into **Henry Hills** on Boylston Street recently. Henry is looking hale and hearty, and is keeping as busy as ever doing consulting work on public utilities. His office is in the Statler Building in Boston. . . . **Buck Clark's** daughter Jean, has presented him with a fifth grandchild which, with the five belonging to his son Harrison, makes a nicely balanced 10. Buck realizes he isn't likely to catch up with **Frank Bradley** who at last count boasted 14, but one can never tell. Anyway, Buck has now outdistanced **Perk Bugbee** who has only nine. Any other claimants for honors in the grandparent department? . . . Presumably by the time these notes are in print, Buck and Mary and Harold and Amy will have enjoyed their usual New Year's get-together at Steele Hill Run, Laconia, N.H., which reminds Harold to wish all of his classmates a most happy and healthful 48th year after graduation.—**Harold Bugbee**, 21 Everell Road, Winchester, Mass. 01890

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A festive atmosphere prevails with the year-end holidays some three weeks hence as these notes are being written, and activities relative to the Institute are in high gear. Local interviews with high school seniors who want to enter M.I.T. next fall, a circuit-riding professor from Cambridge awing New Jersey audiences with advanced computer technology, a Class of '21 officers meeting in Cambridge and the exciting Technology capital improvements program outlined by our distinguished new classmate, President Howard W. Johnson,

all focus on the continuing tremendous impact of M.I.T. across wide areas and phases of life in these United States—in addition to the basic educational endeavors at the Great White City on the Charles. . . . It heightens our pleasure to observe the honor reflected upon the Institute by our Class Vice President **Irving D. Jakobson** through the high honor conferred upon him as a recipient of the Theodore Roosevelt Award in recognition of his years of distinguished service as treasurer of the Community Hospital at Glen Cove, N.Y. Mrs. Richard Derby, daughter of President Theodore Roosevelt, presented the award, a bust of the late president, at a dinner of the Nassau-Suffolk Hospital Council which annually singles out those deserving distinction for outstanding devotion to the voluntary hospitals of the council's two Long Island counties. The citation prepared by the Community Hospital reads: "A tall, dignified soft-spoken man, respected for his modesty as well as for his contributions to community life, is this year's candidate of the Community Hospital at Glen Cove for the Theodore Roosevelt Award. He is Irving D. Jakobson who, as Treasurer of the hospital since 1951, has guided it through innumerable building and modernization programs where his advice was constantly sought and was of inestimable value. As President of Jakobson Shipyard, Inc., Oyster Bay, N.Y., Mr. Jakobson is a busy executive. An active and tireless worker, his business acumen has served the hospital in good stead, and he has established a financial structure with sound policies as a guide to the hospital's fiscal operation. He has seldom missed a Board meeting since his appointment in February 1949, and his foresight, common sense and sound judgment have helped his colleagues on the Board in establishing policy. Another cause of paramount interest to Mr. Jakobson is his work as a member of the Glen Cove Planning Board. This most significant area of city government has been responsible for major decisions effecting the continued progress of the city while still maintaining zoning rules for good country living. He still finds time, however, to indulge in his hobbies as a stamp collector and an amateur yachtsman. A member of the New York Yacht Club, Sewanhaka-Corinthian Yacht Club and Manhasset Bay Yacht Club, he is also a former president of the American Boat Builders and Repairers Association. He was graduated from the Massachusetts Institute of Technology and in 1963 received the Silver Stein, the distinguished alumnus award of the Technology Club of New York. He is married and the father of a son, Peder, a student at C. W. Post College. The Board of Directors of the Community Hospital appreciates the long years of service contributed so willingly by Mr. Jakobson and is honored to select him to receive the Theodore Roosevelt Award in recognition of these endeavors." In a recent letter from his home, Northfield Rd., Glen Cove, N.Y.



Mrs. Richard Derby, daughter of President Theodore Roosevelt, presents a bust of the late President to Irving D. Jakobson, '21, of Northfield Road, Glen Cove, N.Y., President of Jakobson Shipyard, Inc., and candidate of the Community Hospital at Glen Cove N.Y., for the Theodore Roosevelt Award presented annually by the Nassau-Suffolk Hospital Council. The Award was given to honor the accomplishments made over the years by Mr. Jakobson as Treasurer of Community Hospital. The presentation was made at a dinner at the Huntington, N.Y., Crescent Club. (Photo: N. J. Chisholm)

11542, Jake says in part: "During the past summer Ruth and I journeyed to Expo 67 via power boat. Muriel and **George Owens** were with us. While in Montreal we visited at the homes of Muriel and **Eric Smith** and also A. D. and Laura Ross, Class of '22. We spent a delightful afternoon and evening with them—a minor reunion." Jake also tells us that he and Ruth will fly to South Pasadena after Christmas to see the Tournament of Roses Parade and the Rose Bowl game with Marge and **Jack Kendall**, the latter officially identified with both events since his early youth. The Jakobsons will then continue on to Honolulu, where they will visit Catharine and **Harry Field**. On the return trip they will stop over in Palm Desert, Calif., to see H. W. McCurdy, '22, who rowed with Jake on the first M.I.T. crew. Jake has sent us some gorgeous U.N. first day covers, including the unusual souvenir sheet of the Marc Chagall window.

Augustus B. Kinzel delivered the principal address at the convocation celebrating the sesquicentennial of the University of Michigan, which conferred upon him an honorary doctor of engineering degree. **Ed Farrand** reports that Gus has retired from the presidency of the Salk Institute of Biological Studies, San Diego, Calif. Having previously retired from Union Carbide Corporation, where he had been vice president in charge of research and engineering, we wonder what new activity this dynamic personality will now undertake. He has given his home address as 1738 Castellana Rd., La Jolla, Calif. 92037. . . . **William J. Sherry** was a doubly honored guest at the inauguration of Dr. Eugene L. Swearingen as the 17th president of the University of Tulsa. Bill was a member of the academic procession, robed in M.I.T. regalia, as the official delegate from the Institute. He was

also a special guest at the ceremonies as a former governor of the foundation at Oklahoma State University, serving under Dr. Swearingen, the then vice president. . . . **Edmund G. Farrand**, our—and the first—Class Estate Secretary, flew from his home, 5981 La Jolla Mesa Dr., La Jolla, Calif. 92037, to Cambridge on December 13 for a meeting of all Estate Secretaries. The following day he attended a meeting at Technology of several of the officers of the Class of '21 to help shape plans for our fabulous 50th Reunion in 1971. Others present were President Ray St. Laurent, Vice President Irv Jakobson and Class Agent Ed Dube.

You now have received a letter and several sheets of the specially designed stationery for our 50th Reunion, sent by **George A. Chutter**, Reunion Committee Chairman. This novel idea is another first in the long series of innovations created by the Class of '21. Please put the letterheads to good use for inviting your classmates fraternity brothers and other special friends to meet you and your wife at our most significant reunion. Tell George how much you like his idea and ask him for more sheets by addressing a request to him via Box 305, East Dennis, Mass. 02641. . . . You also have a letter and questionnaire from Irv Jakobson, who is most interested in your reply. You will note the 22 devoted members of the Class, listed on Jake's letter, who are serving as area chairmen for our 50-year gift to the Institute. Recent additions to this list are **C. Harry R. Johnson** for Alabama; **Roy A. Wehe**, Northern California; **Dr. Elmer W. Campbell**, Maine; and **Thomas W. Bartram**, West Virginia. Inadvertently, the name of **Eugene W. Rudow**, Area Chairman for the State of Washington, was omitted from the Amity Fund list accompanying the mailing, and we hasten to make amends publicly. . . . **George A. Chutter** writes, in part: "Marion and I spent Thanksgiving in Springfield, Mass., and returned home by way of Manchester, Conn., where we stopped for a visit with Helen and **Ray St. Laurent**. I attended the November meeting of the Alumni Council at M.I.T. along with **Josh Crosby** and **Ace Rodd**. Generally, **Mich Bawden** is there but we missed him this time."

Miles M. Zoller, who has made his home in Florida since retirement in 1963 as vice president of the Eagle Picher Company, Cincinnati, now gives his revised home address as 200 Fairway East, Tequesta, Jupiter, Fla. 33458. . . .

John A. Scott, who has retired from the General Electric Company Schenectady, N.Y., writes that his new Florida home is at Apt. 35C, 3015N. Halifax Ave., Daytona Beach, Fla. 32018. . . . Another Floridian, **Philip R. Payson**, who retired in 1963 from S.K.F. Industries, Cleveland, says the correct address of the new home he built is 5031 Northampton Dr., Tanglewood, Ft. Myers, Fla. 33901. . . . Boston-Florida commuter **George Schnitzler** reports a new

retirement address at the southern terminus of his travels, 1076 Venetian Way, Miami, Fla. 33139. . . . **Herman F. Finch** writes from his home at 100 Font Blvd., San Francisco, Calif. 94123, that he retired in 1962 after serving for many years as structural engineer on construction projects for the Panama Canal. He has resumed his engineering career as supervising structural engineer in the California State Building Standards Commission, with headquarters in San Francisco. He continues active membership in the American Society of Civil Engineers, the Society of American Military Engineers and the Structural Engineers Associations of Central and of Northern California. He modestly states his sole recreation is "to play at golf as an excuse to walk around the golf course." He and Lillian have three sons. Robert, a graduate of the University of Detroit, is married; William, single, was graduated from the University of California; and Richard is a student at San Francisco City College.

Col. Asher Z. Cohen, U.S.A., sends a note from his new address at La France Apts., 1165 Marseilles Dr., Miami Beach, Fla. 33141, saying: "What a pleasant surprise to find your letter upon our arrival here. It is needless to tell you how much I appreciate your thoughtfulness. We plan to stay here only until the end of March to determine whether we will like it well enough to move here permanently. I retired in September 1966 [Supervising Engineer on Weapon Systems, Edgewood Arsenal—Cac], but made no plans for any activity because of a pending cataract operation, which was initially accomplished last June. Surgery was successful but it kept me confined for about three months. I have a number of possibilities under consideration, awaiting a decision about moving to Florida. If it is in the negative, we may go back to New Jersey. I called **Ed Mandell** here but could not reach him. Also drove to his office but found him away. Mrs. Mandell told me there are quite a few M.I.T. men locally and Ed has been thinking about organizing an alumni club in this area. If we move up your way, I shall see you at the New Jersey Club meetings; if not, I am looking forward to our 50th Reunion. Note that I am using the letterhead I received from George Chutter; it is an excellent idea and I plan to write to him to that effect. I had planned to see **Ted Steffian** on the way down here but could not make it. Will try to drop him a line."

Robert F. Miller, Class Photo Historian, writes from his home at 7910 Birnam Wood Dr., McLean, Va. 22101, and says, in part: "This month I can give you a couple of items of news. The first concerns grandchildren, our sixth arrived last November 5 in the person of Stephen D. Miller, born in Midland Park, N.J., the second son of our son, Bob, and his wife, Mary Kay. This makes two grandchildren to carry on

the family name. Our other four, two boys and two girls, are the children of our daughter, Peggy Ann Weaver. Unfortunately, Stephen didn't arrive in time to make the picture for our Christmas cards. Neither did our daughter, Kathleen, who is still in Mexico City. She will be home for the holidays and will then return. My second item concerns Graciela and **Helier Rodriguez**, who were here for dinner last October along with Graciela's sister, Rita Reynaldo, and her husband, Edelberto, who is a biological research chemist in the laboratories of the National Institute of Health. We had a delightful time reminiscing about our visits and that of the Class of '21 to Cuba. A third item covers the Thanksgiving weekend visit which Helen and I made to San Juan, P.R., and St. Thomas, V.I. We wanted to see the Rodriguez couple again before they returned to Spain, but the hotel didn't tell us Helier had phoned twice. In fact, they told him we weren't even registered. I didn't know how to reach him, so we missed each other. We found the San Juan climate delightful. The temperature was in the upper 80's and swimming in the Atlantic was not hard to take. St. Thomas was a pleasant surprise. The rugged, hilly terrain, covered with tropical foliage, reminded us of Acapulco. To sit on the patio of the 1600-foot-elevation hilltop restaurant, drinking the specialty of the house—banana daiquiris—and looking at the gorgeous sight below was an unforgettable experience. I imagine the yachting enthusiasts of the Class have been there to enjoy the marvelous sailing."

C. Harry R. Johnson has sent us a personal note which we reprint with deep sorrow: "Mrs. Johnson died on October 23 from cancer in the lungs. It was discovered following a severe attack of pleurisy in February. I feel we added a few months to her life with chemotherapy treatments both at Mayo's in Rochester and at M.D. Anderson, Houston, Texas. She never smoked in her life. I was fortunate in that I could be with her during this whole period. When we were in Michigan, she was a leader in parish and diocesan affairs for years. She was also a leader of one of the oldest women's literary clubs. She never played golf until we built our home here in the middle of our golf course. I have no complaints, as our few years here together in retirement were wonderful, and so they were when we were active in the rushing part of our lives." On behalf of his many friends, we extend sincere condolence. Harry retired in 1965 as president of the Consolidated Packing Corporation, Monroe, Mich. He and Lila moved to a home on the golf course of the Grand Hotel in Point Clear, Ala. He continues as a director and vice chairman of the board of Consolidated. You can address him at Box 318, Lakewood Estates, Point Clear, Ala. 36564.

A clipping from the *Wall Street Journal* of last September 6 is one of several of that date which relate to an an-

nouncement by **John W. Barriger**, President of the Missouri-Kansas-Texas Rail Road Company, that the Katy has plans to reorganize into a holding company to be known as Katy Industries, Inc., and acquire other diversified interests in the industrial field. Named as a factor in supplying assistance for the proposed program was the Bangor Punta Corporation, the former Punta Alegre Sugar Corporation. We are indebted to the alertness and courtesy of Ed Farrand for this recent data on John's many endeavors to further the progress of his railroad. . . . **Ed Farrand** has written and phoned us from the West Coast about his Class Agent and Estate Secretary activities and efforts in behalf of our forthcoming 50-year gift to Technology. He and **Ed Dubé** are in constant communication and have developed into a most efficient team—each sending us flowery verbal bouquets for publication about the cooperation and accomplishments of the other. Of their combined labors, Ed says: "As I see it, our objective is to keep abreast of the basic factors associated with the continual growth of M.I.T. and the expansion of its fields of activity, so as to be able to interpret, for our '21 community, the related fiscal requirements. However, we must not lose sight of the fact that it is the policy of the Alumni Association not to permit our endeavors to obscure or interfere with the many other valuable and interesting contacts which exist between the Institute and its alumni."

As predicted, **Saul M. Silverstein** was off in October on foreign safari No. 26 since 1952, even before our words appeared in print. Quoting from his first newsletter for this trip, he and Rigi flew to London for a five-week business trip which took him to the Netherlands, Scotland, Belgium, France, Germany, Italy and Switzerland. Following a holiday week in Israel, Rigi left for their home, 28 Stephen St., Manchester, Conn. 06040, while Saul resumed his business activities for an additional three weeks in Hong Kong, Korea and Japan. . . . A personal note from **Sumner Hayward** of 224 Richards Rd., Ridgewood, N.J. 07450, enclosed clippings of interest to '21 classmates and the most encouraging news that he is rapidly recovering from his recent surgery. Says Sumner: "I continue to make progress and have been on two hikes in Harriman State Park of five and seven miles, respectively." . . . Ray St. Laurent has sent us a letter he received from **James R. Cudworth**. Written on the stationery of the Office of the Dean, College of Engineering, University of Alabama, Box 1968, University, Ala. 35486, Jim says: "I am enclosing a copy of the piece which appeared in the *Tuscaloosa News* when I became Dean Emeritus in September. I shall stay on as professor this academic year and then go to the U.S. Bureau of Mines station here as mineral technologist consultant. So, you see, I'm not really retiring at 70—just getting out of stress and

strain, I hope. We were in the United Kingdom last April and May, and I went to mining meetings in Las Vegas and Denver in September. I hope to go to the Orient in the spring or summer of 1968. It has been lots of fun working with students and faculty (45 years of it), and if I were starting all over I believe I would follow the same course. Our younger son, Allen, and three grandchildren live in Needham, Mass., and we were there last June to see him get his doctorate from the Harvard School of Public Health. He started in electrical engineering here, took his master's in Course VI in acoustics at M.I.T. and is now director of research for Liberty Mutual Insurance Company. Our other son, James, is a director of power utilization for the T.V.A. at Chattanooga, Tenn. We are looking forward to the 50th Reunion and might also be interested in another trip to Mexico. We have gone there several times and are very fond of the country, since I started there in 1921." Jim has long served as Director of the State School of Mines at the University of Alabama. He is the author of 17 principal publications in the mining engineering field. He has chaired a number of professional engineering committees, including the industrial minerals division of the American Institute of Mining and Metallurgical Engineers and is a former secretary of its Southeast Section. He was also director of the Engineering College Research Council. His memberships include the American Society for Engineering Education, Sigma Xi, the Newcomen and Cosmos Clubs.

In ample time for Christmas, **Ralph M. Shaw, Jr.**, 608 Riverbank, Beverly, N. J. 08010, has sent us another batch of fine stamps, together with some unusual U. S. postal stationery of ancient vintage. . . . **Dugald C. Jackson, Jr.**, says in a recent letter: "Here are some slides to add to your collection of '21 memorabilia. One shows **Harry P. Field** and me in the Field's apartment in Honolulu; eight of Technology alumni fighting bulls in the ring at the Cortijo de la Moreno during our '21 reunion in Mexico last March; and two of Marge and **Jack Kendall**, Betty and me at the de Cortes monument in El Paso de Cortes between Popocatepetl and Ixcacihuatl. We are going to have a twosome Thanksgiving and will go out for dinner. But at Christmas we shall make up for it. Our four families are planning to be here then to celebrate—a bit early—our 50th wedding anniversary, which is really on January 20, 1968. If we don't get together sooner, we'll see you two at the 50th Reunion in 1971." For the Class, our thanks and our congratulations go to Betty and Dug at Tetrastemma, Harmony Hills RFD 1, Havre de Grace, Md. 21078. . . . Writing from his winter home at 633 Royal Plaza, Ft. Lauderdale, Fla. 33301, **Robert S. Cook** says: "I enclose a few pictures taken at our 45th Reunion which I hope will be suitable for your collection. Mrs. Cook and I en-

joyed a six-week European trip last August and September. We saw Helier and Graciela Rodriguez in Madrid and had a good visit. They stopped off to see us last October in Ft. Lauderdale."

It is with heartfelt sorrow that we record the passing of two members of the Class of '21 and extend sincerest sympathy to their dear ones on behalf of the entire Class. . . . **Aubrey Jennings Northrop**, 540 Allen St., Syracuse, N.Y. 13210, died on May 29, 1967. A native of Syracuse, he was associated with us in Course II. At M.I.T. he was a member of Delta Kappa Epsilon and trained in Naval Aviation at Technology during World War I. He had served the New York Telephone Company in various managerial capacities for 38 years and was in charge of military accounts at the time of his retirement in 1963. He was a Life Member of the Telephone Pioneers of America and also a member of the University Club of Syracuse and the Optometist Club. He is survived by his wife, Alice Stone Northrop; three daughters, Mrs. William C. Heeber of Syracuse, Mrs. E. Keith McCord of Fayetteville, N.Y., and Mrs. Wallace R. Seeley of Rochester, N.Y.; and eleven grandchildren. We are indebted to Mrs. Northrop for her warm letter of appreciation for the sympathy expressed by the Class of '21 and for her aid in preparing these notes. . . . **George Wheeler Coffin**, Edgartown, Mass., 02539, died on October 5, 1967. Born in Dorchester, Mass., in 1898, he was associated with us in Course VI. He had served for many years in sanitary engineering and as senior civil engineer with the Metropolitan District Water Supply Commission of Boston and the State Department of Public Health on water supply problems. He had worked on the Quabbin Reservoir project and, during World War II, he was in charge of water supply construction for the federal government at Quonset Point, R.I. Considered to be one of the most experienced water supply engineers in the eastern U.S., he founded the engineering firm of Coffin and Richardson, Inc., of Boston and was engaged in extensive projects in Maine, New Hampshire, for the towns of Brookline and Wellesley and at Boston Logan International Airport. He was a member of the American Society of Civil Engineers, the New England Waterworks Association and the Oriental Lodge of Masons. He is survived by his wife, Sara, and a sister, Charlotte Coffin of Edgartown.

It is now only a little over four months to a meeting of that hardy group of classmates and their wives who loyally gather annually at Alumni Day—to be held this year on Monday, June 10, on campus in Cambridge. Wish you'd write us that you'll be there and give us the latest on your retirement activities (or inactivity), your travels or your grandchildren. If it is more convenient for you, tell it to a tape recorder and mail us

the reel—any of the three standard sizes or three standard speeds will be satisfactory for playback on our machine.—**Carole A. Clarke**, Secretary, 608 Union Lane, Brielle, N. J. 08730; **Edwin T. Steffian**, Assistant Secretary, c/o Edwin T. Steffian and Associates, Inc., 19 Temple Place, Boston, Mass. 02111

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It's really inconceivable that anyone desiring pleasant weather should look beyond Buffalo. As we write these February notes in December, we read of snow storms in Boston, New York and Washington but look out upon 45 degree weather and sunny, blue skies. Many of my friends play golf daily while the younger Fergusons drive 25 miles south of Buffalo to ski at Kissing Bridge Club. . . . **Yardley Chittick** has written a most welcome note regarding his pseudo bachelorhood during Ruth's visit to Nairobi, Kenya, where she spent two weeks going out on trips in the neighboring wilds to see and photograph the animals. She also flew to Tananarive, the capitol city of Madagascar, to visit old friends now stationed at the American Embassy. . . . **Abbott Johnson** starts a three month's cruise on the *Kungsholm* leaving from New York late in January. Sounds wonderful! . . . **Yard Chittick**, **Bill Bainbridge** and **Abbott Johnson** were at **David M. Minton's** funeral in November at Pelham Manor, N. Y. They expressed the sympathy of our Class to Emilie and his family. . . . We also send the sympathy of our Class to the family of **Thomas A. Quirk** of Braintree, Mass. Tom had been a mechanical engineer for the First Naval District in the design section on Summer Street. He was also a registered Professional Engineer. . . . **Charles S. Comey** writes that he has purchased a home in Sun City, Ariz., and hopes to move there early in the spring after disposing of Florida property. Mr. and Mrs. Comey will be at home at 12439 E. Cherry Hill Drive. . . . We have received word that **Leo Freeman**, as Vice President and Manager of the Sugar Mill Division of Gruendler Crusher and Pulverizer Company of St. Louis, travels to the major sugar producing areas throughout the world each year. Thus far he has made five trips around the world. He has several active patents for sugar mill operation, particularly in the preparation of sugar cane prior to milling in order to obtain higher efficiency from the mills.

Crawford H. Greenewalt's personal secretary, Mrs. Yahner, received quite a write-up in the Wall Street Journal in December as they described her helpfulness during his experiences with the atomic bomb, hummingbirds, a Bermuda estate and orchids. They described Mrs. Yahner as a gracious, silver-haired lady and something of a senior stateswoman among the singular group of executive secretaries. In November, Crawford received the first Robert E. Wilson Award in Nuclear Chemical Engi-

neering of the Nuclear Chemical Engineering Division of the American Institute of Chemical Engineers. The award recognized outstanding chemical engineering contributions and achievements in the Nuclear Industry. His contributions are both technical and managerial in that he was deeply involved in both of these areas in Du Pont's nuclear engineering effort. . . . Professor **Fritz J. Roethlisberger** of the Harvard Business School has written about the two constellations of ideas which are competing for attention: 1) ideas about what constitutes scientific knowledge about behavior in organizations, and (2) ideas about what constitutes effective action toward administrators. He now writes on administration and science aiming to clarify two different kinds of knowledge and theories, and to establish what keeps them diverging instead of converging. This concerns "the practice of science" and "the science of practice." At this stage the project has taken the form of an autobiographical account of the author's search for his subject material and identity among the illusive phenomena of social science. He has also joined **William Dickson** of Western Electric in evaluating a program on employee counseling.

We are delighted to hear from **William W. K. Freeman** of Salem, Mass. who reports: "I am completing my fourth year of teaching, mainly Latin and Mathematics but also English and even Music, at the Tower School in Marblehead. This is my third career, having also worked as a hydro-electric engineer and statistician of an insurance company. It's an exciting and stimulating life. I helped my sixth graders write a comedy for the award of prizes, to my seventh and eighth graders for composition of poetry; and the next year they helped me write a Latin play, which they acted with spirit and fluency. In order to have warning concerning when to retire I annually ask each class to write a confidential evaluation of my teaching, which I send to a young and close friend to summarize and report back to me. My kids are very cooperative in this and quite frank." . . . **Donald F. Carpenter** writes from Mendenhall, Pa., that he is organizing for the 50th Reunion gift. He suggests that we make our contributions over the next five years more generous than before, but perhaps at a lower cost by recognizing the advantages of various tax laws. A life income plan and other ways to arrange deferred gifts might suit the future desires of many Classmates. **Hugh Darden**, Institute Estate Secretary, will be happy to work something out to our mutual advantage. . . . Your Secretary had the unique experience this Fall of joining the other directors of the Erie Lackawanna Railroad in a combination Directors Meeting and inspection trip on the train. The Directors' Special was made up of business cars and an observation car. We travelled through the beautiful mountains of Pennsylvania into New York State near Binghamton,

then on to Elmira, Hornell and Buffalo. The official Board Meeting was held during the trip and explanations were constantly provided, telling of the condition of the right-of-way and of various shippers in the respective communities. After an evening inspection of the electronically controlled switchyard in Buffalo, we travelled overnight to Meadville, Pa., to watch a large scale track-laying operation and see the car repair facilities in the Meadville Shops.

Lunch was served during the trip to Cleveland, where we were transferred to the ore docks to inspect large scale unloading of iron ore pellets from ship to gondolas on the way to the Youngstown steel mills. Dinner that evening was at the Union Club where we were joined by Cleveland bankers and business men. It was a concentrated education into the mysteries of railroad operation and maintenance, indicating that it takes many dedicated and responsible people to carry on such an important segment of our economy.

Among the new addresses received are those of: **Alfred Wolf**, Berkeley, Calif.; **Erb N. Dilton**, Sunderland, Mass.; **Robert N. McClellan**, East Dennis, Maine; **Conrad E. Ronneberg**, Granville, Ohio; **Ross B. Warren**, Rio Grande City, Texas; and **Rudolph H. Blatter**, Arlington, Va. . . . And off we go to the sunny South for those with long vacations or on retirement. Many, however, will stay in the invigorating atmosphere of the North (like Buffalo) and thoroughly enjoy the privilege of change and challenge.—**Whitworth Ferguson**, Secretary, 333 Ellicott Street, Buffalo, N.Y. 14203; **Oscar Horovitz**, Assistant Secretary, 33 Island Street, Boston, Mass. 02119

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45th Reunion; Blue Water Resort Hotel, Bass River; June 7-10, 1968; for reservations: Forrest F. Lange, 1196 Woodbury Ave., Portsmouth, N. H. 03801

The Class of 1923 will hold its 45th Reunion from June 6-9, 1968 at the Blue Water Motel, 328 Winter Street, Hyannis, Mass. Reservations will be confirmed directly to the motel, and each guest will be responsible for his own charges. Future mailings to Classmates will include information such as motel folders, registration cards and reservation slips. The Class dinner will be on Saturday evening. The President has appointed the following Reunion Committee: **Dave Skinner**, **Forrest Lange**, **Howard Russell**, **Burt McKittrick**, **Ray Bond**, '22, **Alan Allen**, **Herb Hayden**, **Royal Sterling**, **Parker Holden** and **David Kaufman**. Movies and picture taking are to be coordinated by **Alan Allen** assisted by **Royal Sterling** and **Herb Hayden**. Information concerning other committees will be furnished when available. Movies and slides relative to class activities and past reunions are solicited. Anyone having movies or slides should

contact Alan Allen, 525 Lexington Ave., New York, N.Y. 10017, Royal Sterling, or Herb Hayden as soon as possible. Alan reports that short sketches, even if not complete, often supply just the right details. Royal Sterling sent in quite a lot of short movie scenes which blended into the whole picture so well that even Royal had difficulty pointing them out. It would be most helpful for us to know the year that a picture was taken. Sometimes we have to spend long hours matching clothes, wrinkles in brows, or the size of bald spots to try to get pictures into the right reunions. It would assist the Reunion Committee if those who have not sent their five year dues check for 10 dollars would do so. It is also important for all classmates to inform the Secretary of any change of address, and also of news about themselves. If you have any ideas on how this Reunion can be made more enjoyable, please contact your Secretary.

Albert J. Pyle, 470 West End Ave., New York, N.Y., writes, "Here is my check for class dues including an extra 10 dollars to cover someone else who might fail to remit. My wife Miriam and daughter Cynthia were at the 40th Reunion. We won't be able to attend the 45th since Miriam and I will be on an extended trip to Europe. Hope everyone will have a great time." . . . New York Central President, **Alfred E. Perlman** was 55 when he and the late Robert R. Young began serious negotiations with Pennsylvania Railroad executives working toward a merger of their lines next Month Alfred will turn 65, and he is still waiting for the merger to occur! . . . *Home Front U.S.A.* by Adolph A. Hoehling has been reviewed by **D. G. Brinton Thompson**, Professor of History. The review is interesting and refers to other sources of pertinent information on the same subject. . . .

Thomas B. Drew reports: "On July 1, I became Professor Emeritus of Chemical Engineering at the Institute, but I am still keeping my hand in on a part-time basis. I have just been notified by the joint award committee of the A.S.M.E. and A.I.Ch.E. that I am the 1967 recipient of the Max Jakob Memorial Award for work in heat transfer. This is the third time that this award has come to a member of our Chemical Engineering Department." (The others being William McAdams, '17, and Hoyt Hottel, '24.)

B. E. Warren reports: "Retired from M.I.T. in June, 1967. Will be spending 1968 as a visiting professor at the College de France." . . . **Arthur L. Hill** reports: "I am now employed by the Ensign and Bickford Company as Manager of their new plant at Louviers, Colo. . . . In March 1966, **Russell W. Conant** became Senior Associate, Photographic Physics, of L. M. Dearing Associates, Inc., 12345 Ventura Blvd., Suite R. Studio City, Calif. 91604. His mailing address will continue to be 3774 Effingham Place, Hollywood, Calif. 90027. . . . **Harold C. Pearson** reports: "As a non-contributor to Class

Notes for many years, for the first time I am breaking precedent. My justification, if needed, is that other classmates are involved as well as my wife, Conchita. Almost a year ago **Harold Bjerke** wrote me to suggest that I join him and his charming wife Lena for a month or two in a house he had rented for October and November on the Costa de Sud in Spain. He said that he was inviting **Doc Smith** and his wife Eleanor too. . . . Accordingly, early in September Eleanor and Doc set off for Oslo to spend a few days with Lena and Harold before driving together to Spain. Conchita and I flew to Lisbon and drove north. After travelling for 10 days we flew to Malaga where Harold and Doc were awaiting us at the airport. The next three and one-half weeks were most enjoyable! There was much time devoted to reminiscing. A few Tech songs were attempted, but we found that our memory of some of the words was poor. We made a few trips from our home base. . . . After our delightful stay with the Smiths, we reluctantly said good-bye to Lena and Harold and flew to Lisbon. We spent five days there and took several side trips before boarding our respective planes for home. On reflection we have concluded that the members of the Class of '23 must be unusual when three old classmates and their wives could live together most congenially for a month. Eleanor and Doc have invited us to stay with them in Cleveland on our way to Mexico early in December. Conchita couldn't pass up the opportunity to talk up the Fiesta in Mexico City in March, and we are hopeful of success. There is a good possibility that the Bjerkes, the Smiths and the Pearsons will be there. Note to all classmates—how about letting us serve as a small nucleus for a real attendance of '23 men? Until March in Mexico."

Stephen B. Metcalfe has retired from the U.S. Steel Corporation, and reports two children and four grandchildren.

. . . **C. Frederick Smith** is President of Brockway-Smith-Haigh-Lovell Company, and reports two children and eight grandchildren. . . . The following are changes of address: **Erwin G. Schoeffel**, 2830 S. Ocean Blvd., Palm Beach, Fla. 33480; **Norman L. Weiss**, 2030 E. Broadway, Tucson, Ariz. 85719.—**Forrest F. Lange**, Secretary, 1196 Woodbury Ave., Portsmouth, N.H. 03801; **Bertrand A. McKittrick**, Assistant Secretary, 78 Fletcher Street, Lowell, Mass. 01852

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Hoyt Hottel, Professor of Chemical Engineering at M.I.T., has received another honor. This time it's the 1967 Founders Award of the American Institute of Chemical Engineers. It was presented at the 60th annual meeting in November. The announcement listed some of Hoyt's many accomplishments and prior awards. They're a bit lengthy to include here, but suffice to say if he wore all those medals as chest decora-

tions at one time, he would be understandably round-shouldered. . . . Looks as though **Jimmie Crist** is another classmate who is picking up directorships. After a career in the utility business (the Southern Company), he is now listed as Chairman of the Executive Committee, United Trust Life Insurance Company, and has recently been elected a Director of the Anderson Electric Corporation, in Alabama. . . . Maybe you don't know that M.I.T. now has an Archivist, Professor E. Neal Hartley. You should, because it's just possible you have memorabilia he's anxious to get his hands on. **Eric Brater** did. He showed **Russ Ambach** his bound volumes of solutions to problems he had done as a student, about 25 of them. "Masterpieces of neatness, and sketches the like of which I have never seen or heard of," said Russ. He acted as intermediary, found that Professor Hartley was indeed interested, and Eric sent them along. Here is part of the acknowledgement: "I could say that I have never encountered anything like them in all the years I have spent within the walls of universities. They will get, as they deserve, good care in Archives and will, I am sure, some day provide scholars of the history of engineering or the history of M.I.T. with rich documentation of teaching-learning activities in your period." Got any good documentation of your own lying around the house?

A very nice note from Helen Winger enclosed another gift to the 1924 Memorial Fund in Ed's memory. It was seven years ago, just before Christmas, that that frightful crash occurred in New York. Helen says that the past year brought her two more grandsons, but she's still waiting for the first granddaughter. . . . Although he retired from John Hancock more than three years ago, **Reginald B. Miner** still keeps his hand in. His last seven years were spent as Vice President in charge of Mortgage and Real Estate Investments. Now he is a member of John Hancock's Real Estate and Mortgage Investment Committee, and also of the Investment Committee of the Brookline (Mass.) Savings Bank. . . . **Sox Kinsey** has retired from Union Carbide and is getting into politics in a modest way. He is starting out as a Village Trustee in Scarsdale, but who knows what heights he may attain? . . . As these notes are being written the Christmas cards are just beginning to arrive, so we can't report any news from that source as yet. However, the **Rockwell Herefords** jumped the gun and sent "Happy Thanksgiving and Season's Greetings" a month before anyone else. The timing was no doubt prompted by the fact they had just moved into their new home in Carmel, Calif. There was a photograph and a message, "Here is our new Carmel home on Hatton Road where we are enjoying our harvest of the patient years." . . . There will be much more news next month, if the Christmas cards live up to expectations.—**Henry B. Kane**, Secretary, Lincoln Road, Lincoln Center, Mass.

Most of you are aware of the fact that **Ralph Gow** was elected to the M.I.T. Corporation last June. One of the duties given to the Members of the Corporation is that of serving on a Departmental Visiting Committee; and Ralph was at M.I.T. in connection with both the Corporation Meeting and a meeting of the Visiting Committee for Civil Engineering on December 1. It was my pleasure to be present at a party given by the Chairman of the Committee, Luis A. Ferré, '24, and the Head of the Civil Engineering Department, Professor C. L. Miller, '51. Ralph and his wife were there, and it was indeed a pleasure to have a few minutes to talk with him. It so happened that on that day he had retired from the Norton Company with which he had been associated almost continuously since graduation. He will have plenty to do since he has a number of directorships which will take some of his time; and he has other plans for those things he has not had time to do in the past years which kept him so busy. . . . It was also my pleasure a few days ago to have lunch with **Jim Howard** who is working on the Alumni Fund in the Boston Metropolitan Area. This should serve as a reminder to you that if you have not already made your contribution this year, now is the time. A note had been received from Jim Howard which indicated that he and Kay had recently returned from a long postponed vacation on which they enjoyed a scenic tour of the British Isles, Holland and Switzerland. Although the weather was not the best for touring, scheduling was much easier and the crowds much smaller. Switzerland was so interesting that they hope to return there soon.

Notes received from several other classmates will most certainly be of interest to you. **Don Taber** states that having reached the magic age of 65, he expects to spend a few months each winter in Boca Raton, Fla. His name will be in the telephone book and any classmates in the area should plan to give him a call. . . . **Clifford Abrahamson** retired on April 1, 1965, after 40 years in the electric motor and control business, and he and his wife are enjoying their retirement at Waquoit on Cape Cod. . . . **Archer Nickerson** writes that he is now semi-retired. Since the sale of the Bethlehem Steel Shipyard in Quincy, Mass., some four years ago, he has continued as one of J. E. Bowker Associates, Inc., Boston, in the largely marine engineering practice. He designed and built a new home in Duxbury, Mass. in the summer of 1966. It is a beautiful spot, a nice destination for a ride if friends will buzz him first at 934-2219.—**F. L. Foster**, Room E19-702, M.I.T., Cambridge, Mass. 02139

This beautiful cloudless morning at Pigeon Cove is not conducive to writing



The Philip Loew ('26) Arts Program will be presented annually by the M.I.T. Hillel Society as the result of the generosity of the late Mr. Loew's family. In the picture Rabbi Herman Pollock, Adviser to the B'nai B'rith Hillel Foundation at M.I.T., receives the trust fund from Mrs. Loew; others are (left to right), E. M. Loew,

Philip Loew's brother; and Mrs. P. David Fine and Mrs. Sheldon Jacobson, Mr. Loew's daughters. The program is considered an appropriate memorial because of Mr. Loew's deep interest and pride in M.I.T., his love for music, and his desire to encourage an appreciation of Jewish culture on the part of college youth."

class notes. There's nothing visible on the horizon to distract—only a couple of hungry gulls on a rock out front. It's just a lazy morning and the class notes folder is rather thin. I've been trying to "antique" some picture frames and have them spread around the living room, adding to the distraction. . . . Let's see what we do have in the folder. Several back of the envelope comments on the form sent by the Alumni Fund are still here, so let's make use of them. **Gilbert Delvaile** says, "I retire in June, 1968! The last 38 years were spent with California Electric Power Company, a utility serving Southeastern California, until, in 1965, California Electric was merged into Southern California Edison Company. P.S. What happened to Canals and Chidsey?" (The M.I.T. Alumni Register lists **C. S. Canals** as being with the Frederick Snare Corporation, 233 Broadway, New York City. **Robert S. Chidsey** is listed as being Town Engineer, Box 487, Simsbury, Conn.) . . . The next one, by **Whit Ashbridge**, says he is "still busy building Veterans Hospitals around the country. Went to Long Beach, Calif., for dedication of two big new buildings at our hospital there on October 1. Just back from a hunting trip to Alaska where I shot a mountain goat, a white Dall sheep and got a lot of exercise, up and down the steep rock slides! Oldest son teaching and a father himself; younger son in Army; daughter in college."

And here's one from **Bean Lambert** which brings us up-to-date on several classmates. "In June went to Richmond, Va., for wedding of Henry Hoar's, '25, daughter. In August to Philadelphia for wedding of **Ned Lame**'s son where I saw Sid Brooks. Henry is retired and

living in Williamsburg, and Ned is a semi-retired doctor. Both have delightful wives and children. I do myself! Also prematurely retired." . . . The last one states that **Arthur C. Fuller** is busy on the Membership Committee of the M.I.T. Club of San Diego, Calif., and hopes this club will succeed in having the 1969 M.I.T. Alumni Association Regional Meeting at San Diego. . . . We quote from **Ed Huckman**'s Christmas card which arrived real early, "After 40 years with Foxboro, I am retiring and we are heading for West Hartford, Conn. For the past six years we have been in Canada and enjoyed it very much but we think the visit to Pigeon Cove during the 40th Reunion helped interest us in returning to New England. Eleanor and I hope the Class of '26 people will visit us in our new home at 11 Blue Ridge Lane. The Welcome Mat will always be out. Sincerely, Ed Huckman."

Have we given you enough news items to give us license to ramble? We are going to do it anyhow—particularly since it's about M.I.T. The most interesting current phenomenon to us is the blossoming of one of the professors. Most outsiders had never heard of him until a debate between him and Dr. Timothy Leary on LSD was televised. His name is Jerome Lettvin, '47, and I don't believe he has been at the Institute for many years because he had been involved in psychiatric work at mental hospitals which gave him a qualified background for the debate. You may have seen it—I understand from friends in Philadelphia and Chicago that it appeared on the Educational Stations there. It was shown four times in one week on Boston's Channel 2. Dr. Lettvin took Leary apart in such a nice way that he appeared

to shrivel as he sat on his psychedelic carpet, and then was only able to babble a meaningless rebuttal. After this Dr. Lettvin appeared on his own with a group of high school kids plus what looked like an ample group of drop-outs of the type that hang around Harvard Square. I have watched this hour and a half program twice and plan to see it again this evening. Don't expect to see a sartorially TV-groomed character. Lettvin is actually degroomed in an old sweater, sneakers and need of a hair cut. After hearing him, one can only guess that his attire is intentional to emphasize his belief that the country has developed status symbols to the extent that the achievements that are of true worth and importance are overlooked and even unrecognized. He gets the point across because after the first 10 minutes you are listening to the man Lettvin and not the character in sneakers and the old sweater. He doesn't tell the kids what to do—he asks them to use their reason and judgment to decide what to do, and loses no opportunity to point out that followers of the escape route have a hard time using their reason and judgment. Watch for his name on your Educational TV programs and don't miss it. Cheerio until next month.—**George W. Smith**, Box 327, Pigeon Cove, Mass. 01966

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Before the 40th Reunion questionnaires were sent to all members of the class. Those that were returned were put in a loose-leaf book and read by many who were at Bald Peak. For the benefit of those who haven't seen them, here is what the classmates said about their present occupations (addresses available on request). **F. Edward Anderson**, Director of commercial sales offices of components division of Raytheon for U.S.A. **Andrew Anderson**, Vice President of manufacturing of Monroe International Inc. **Dwight C. Arnold**, New England Associate of Standish Space-Age Consultants Inc. **S. S. Auchincloss**, President and Chief Executive Officer of A.M.P. Inc. **F. Sidney Badger Jr.**, retired, consulting metallurgical engineer for Beckman Instruments. **Charles T. Barker**, Manager of engineering of chemicals division of Vulcan Materials Company. **Charles A. Bartlett**, lawyer and Managing Officer of Maine Savings & Loan Association. **William P. Berkeley**, Chairman of the Department of Maintenance and Material management of Ohio State University Defense Management Center. **Robert M. Bigelow**, Research and Development Vice President and director of United Shoe Machinery Corporation. **Adelbert N. Billings**, retired, Vice President of Allegany County (Md.) Historical Society. **J. Robert Bonnar**, Corporate Director of purchasing of General Aniline and Film Corporation. **John J. Boyle**, water supply, wells and test borings contractor. **Stuart J. Bugbee**, plastics department, systems analysis, E. I. du Pont de Nemours and Company. **Joseph C. Burley**, President and Chief Engineer of Boston Insulated

Wire and Cable Company. **Howard H. Burt**, retired. **Gordon L. Calderwood**, Director of Safety of Rochester Gas and Electric Corporation.

Robert W. Carr, President and Treasurer of C. L. Carr Company department store. **Walter E. Caunt**, retired from Wellesley department of public works, consultant in subdivision layouts. **Edward Chase**, supervising civil engineer, Massachusetts Department of Public Works. **James T. Chirurg**, Vice Chairman of Board of Chirurg and Cairns Inc. **Nathan Cohn**, senior Vice President of Leeds and Northrup Company. **James F. Collins**, manufacturers agent. **John O. Collins**, retired. **Morgan Collins**, professor of business administration at University of Michigan graduate school of business administration. **Arthur J. Connell**, Vice President and Director of Stone and Webster Engineering Corporation. **Arthur G. Connolly**, senior partner in law firm of Connolly, Bove and Lodge. **Robert T. Connor**, retired from Army, president of alumni association of the University of Bridgeport (Conn.) **George R. Copeland**, mechanical engineer, U.S. Air Force. **William M. Crane, Jr.**, Market Research Manager, Anaconda American Brass Company. **Richard Cutts, Jr.**, manager of special customer meetings, General Electric Company. **Philip E. Darling**, retired but with Lee Norris Consulting Engineers of Houston. **Thomas H. Darnell**, President of Hancock House of Memphis. **Carlton G. Davies**, forest products wholesaler, partner of Coney-Davis Lumber Company. **Lawrence W. Day**, auditor, Bridgeport Defense Contract Audit. **Paul F. DePaolis**, glass plant manager, Eastman Kodak Company. **Ernest H. Dodge**, just retired from A. T. and T. and putting an old Dutchess County house in shape. **John B. Drisko**, Tippetts-Abbott-McCarthy-Stratton, project engineer on a dam in Pakistan.

William B. Duffy, Superintendent of North Andover (Mass.) Public Works. **Edward T. Dunn**, retired from and consulting for Allied Chemical and Dye Corporation. **H. Lincoln Dyer**, component design engineer, General Electric Company. **John D. Eldert**, Vice President of Machine Parts Co. of Providence. **Horace A. Emerson**, civil engineer and land surveyor. **Robert A. Engel**, retired from Trubeks Laboratories Inc. of E. Rutherford, N. J. **Frederick S. Erdman**, retired from Cornell University. **William C. Erwin**, retired from M.I.T. Lincoln Laboratories. **Willard S. Felch**, supervising engineer, mobile and air-ground radio, A. T. and T. **Howard P. Ferguson**, Manager, wholesale and subsidiary sales, Standard Oil Company of Ohio. **Grenville B. Gerrish**, design consultant for Diamond Instrument and Joy Manufacturing Company. **B. Allison Gillies**, aviation consultant in southern California area. **Lawrence B. Grew**, Southern New England Telephone Company, general transmission engineer. **Francis J. Guscio**, chief of master planning branch, engineering division, U. S. Army Engineers, South Atlantic Division. **G. Albro Hall**,

engineer/secretary of Ohio Water Pollution Control Board. **John W. Harris**, Vice President of Metropolitan Moving and Storage Inc. of Cambridge. **Joseph S. Harris**, retired, commercial real estate. **Richard E. Harrison**, retired, oil industry consultant. **Robert S. Hatch**, retired in Myrtle Beach, S. C. **Richard P. Hawkins**, President of Hawkins Whelan Company of Cambridge, distributors of oil and chemical equipment. **Raymond F. Hibbert**, manufacturers agent—plastics. **Erik Hofman**, retired in Mallorca, Spain.

Donald F. Horton, office of civil functions, office of the Secretary of the Army, mainly water resources development. **George C. Houston**, associate professor, Center for Continuing Education, Northeastern University. **Charles H. Hurkamp**, aeronautical research engineer, Lockheed-Georgia Company. **Harry V. Inskip**, retired, working with civic associations. **Paul N. Ivancich**, Colonel U.S.A.F., retired. **Glenn D. Jackson, Jr.**, completing tour in Iran for United Merchants and Manufacturers Inc., chief Iran consulting textile engineers. **Gordon C. Jacoby**, retired, structural designing and gardening. **William Kaplan**, product engineer, American Oil Company. **Albert P. Kauzmann**, senior engineer, RCA. **Avedis M. Kazazian**, in his own copper mining and milling business in Chile. **Charles Kingsley, Jr.**, associate professor of electrical engineering, M.I.T. **Thomas A. Knowles**, retired, Director of Harwick Standard Chemical Company. **Franklin T. Kurt**, Director of V.T.O.L. development, Grumman Aircraft Engineering Corporation. **Edward A. Leach**, Vice President general administrative and corporate sales, Sangamo Electric Company. **Gustavo Lobo, Jr.**, Senior Vice President, Czarnikow-Rionda Company, sugar merchants. **Percy A. Lovett**, partner, Engineering Service Company of Halifax, consulting engineers. **Selim O. Lunden**, utilities engineer, Connecticut Highway Department. **James A. Lyles**, retired but attends board meetings of First Boston Corporation and Sarah Lawrence College. **Lloyd R. MacAdam**, colonel U.S. Army, retired. **Joseph H. Melhado**, director of Commodity Research, Standard Brands, Inc. **Frank L. Meyer**, President, The Meyer Furnace Company. **Harry J. Moser**, patent attorney, General Electric Company.

Edward E. Mott, Bell Telephone Laboratories, acoustical instrument development. **Jesse G. Nash**, retired, trailer travel, plus home in Beton, Texas. **Roger L. Nowland**, retired from and consultant to his former company, The Nowland Organization Inc. of Greenwich, Conn. **George E. Onishi**, automotive research and development, American Motors Corporation. **Theodore Ordman**, patent trademark and copyright lawyer. **William G. Payne**, President, Payne and Company, importers and distributors of decorative fabrics. **Roger M. Pierce**, electrical research, Worcester Electric

Cable Works, U. S. Steel Corporation. **Middleton L. Perry, Jr.**, consulting electrical engineer, Black and Veatch, Kansas City. **Carl H. Peterson**, consulting engineer, principally engineering economics, Jackson and Moreland. **Louis B. Peterson**, Director of purchases, Newport News Shipbuilding and Dry Dock Company. **John M. Pinkerton**, retired in Daytona Beach. **Charles S. Pope**, architect-historian, U.S. National Park Service. **Lauritz H. Rasmussen**, just retired, living in Milton. **Carl L. Redd**, consulting engineer in Baltimore. **Philip G. Rhoads**, retired from Wilmington, Del., public schools, assistant superintendent of business affairs. **Percy M. Roope**, retired, consultant on physics and photography.

D. Anson Rosenthal, retired and living in New York. **George J. Saliba**, retired and living in Englewood, N.J. **Charles C. Smith**, owner of The Bertram Company, makers of industrial air products in Cincinnati. **R. Moen Smith**, real estate in Yardley, Pa. **Fin Dallas Sparre**, E. I. du Pont de Nemours and Company, head of product label and product regulatory advisory unit in the legal department. **Donald H. Spitzli**, member, house of representatives, New Hampshire Legislature.

George P. Standley, Assistant Manager rayon research, I.R.C. Fibers Division, Midland Ross Corporation. **Frank C. Staples**, President, SuCrest Corporation. **George H. Stark**, utility management for Seattle area, The Boeing Company. **Ezra F. Stevens**, President, Stevens-Arnold Company of Boston. **Ralph W. Stober**, just retired in Newton Highlands. **Charles F. Sweet**, Ingersoll-Rand Company, chief engineer condenser department.

William L. Taggart, President, Dewey and Almy Chemical Division of W. R. Grace and Company. **Charles H. Tedford**, retired from both business and the Army, now consulting. **Francis B. Thorne**, retired and living in Rochester, N.Y., founded multiple sclerosis chapter in San Jose, Calif. **David E. Truax**, heads research on hot-melt adhesives, Stein Hall and Company in Charlotte, N.C. **Edward D. True**, owner, E. A. Hallet Company, retail drugs.

William E. Tucker, retired in Haddonfield, N.J., consulting in TV color optics. Captain **Richard C. Turner**, retired in Dahlgren, Va. **Paul S. Vaughn**, Alco Products Inc., division of Worthington, manager of diesel engine development and product engineering. **Robert C. Wallace**, retired but now back at work with Brockway Truck in Cortland, N.Y. **Russell P. Westerhoff**, Board Chairman, Ford Bacon and Davis Inc. **Charlton P. Whittier**, manager customer packaging services, glass container division, Owens-Illinois Inc. **Frederick W. Willcutt**, manager system planning Department, Potomac Electric Power Company. **Robert Wise**, retired in Brookline and consulting. **Lester B. Woelfenden**, regional

manager of manufacturing, dye-stuff and chemical division, General Aniline and Film Corporation. **Donald P. Wylie**, retired and part-time mathematics professor. **William A. Zisman**, superintendent chemistry division, U.S. Naval Research Laboratory, Washington, D.C. . . . You name it; we have it!—**Joseph S. Harris**, Secretary, Box 654 Masons Island, Mystic, Conn. 06355

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40th Reunion; McCormick Hall, M.I.T. Campus; June 7-10, 1968; For reservations: Abraham Woolf, 15 Court Square, Boston, Mass., or Mrs. Ralph T. Joep, 37 Dix St., Winchester, Mass.

On December 6 the 20 members of the 40th Reunion Committee met for luncheon at the Faculty Club in Cambridge to hear reports of various committee chairman: Those in attendance, starting with the head table and circling, included: Abe Woolf, Florence Joep, Charlie Worthen, Jim Donovan, Walter Smith, Maurice Beren, Jack Chamberlain, Dave Mathoff, Carney Goldberg, Ed Poitras, Willis Tibbetts, Dick Rubin, Norton Case, Frank Horn, Art Nichols, Herm Swartz, Velma Worthen, Ruth Woolf, Emily Horn and Dorothy Swartz. **Florence Joep**, as Vice Chairman, reported on the program for the three days.

Jim Donovan gave us a brief run down on the Class Gift, which is behind schedule and needs plenty of help; and **Ed Poitras** passed around a first report of registration as of December 5, which indicated that 56 members are definitely planning to attend, almost all of them with their wives; 13 who sent in checks and may attend; and 22 who noted with their check that they could not attend. We expect to present a current report in the March class notes as well as April and May. As a matter of fact, we shall probably publish a complete list of those who plan to attend in April or May. . . . Your secretary reports herewith that he has received about 200 biographical sketches for the Reunion Class Book. If you haven't yet filled out and returned the questionnaire you received in November, please do so pronto.

At the chemical show in New York late in November Jim Donovan had the pleasure of seeing **Frank McDermott** and Gus Coloruso, '29. Frank and his attractive wife are planning to be with us at the Reunion. He noted the absence of old friend Thurston Hartwell. For the first time in many years Jim missed seeing **Al Gracia**, **Owen Rideout** and others. . . . A tearsheet from a publication of *I.E.E.E. Transactions On Magnetism* includes an article by **Walter Grimwood**, "Relationships Between Magnetic Tape Properties and Magnetic Oxide Concentra-

tion". A biographical sketch on Walter, accompanying a photograph, tells us that Walter joined the Eastman Kodak Company in Rochester, N.Y., in 1928 and has worked at the Research Laboratories in the field of sound recording since then. For the past several years he has been especially concerned with magnetic recording. He is currently Senior Research Associate in the Physics Division of the Research Laboratories. He is the author of several technical and scientific publications and holds patents relating to sound recording. Walter is a member of the Society of Motion Picture and Television Engineers, the Sound Engineering Committee, and Video Tape Recording Committee of I.E.E.E.

And that very dignified intellectual staring out of an issue of the *I.E.E.E. Student Journal* of early summer is none other than **John B. Russell**, with a biography of his professional life. He is at present Dean of Engineering, Clarkson College of Technology in Potsdam, N.Y., and has served both as teacher and administrator in industrial and educational research. After a couple years as instructor at M.I.T., he rose to head the Department of Electrical Engineering at Columbia University where he was one of those who recognized the Electronics Research Laboratory. During the period between 1955 and 1965 he was in Syracuse, N.Y., at General Electric's Electronics Laboratory. For the greater part of this time he was the manager of the Laboratory with the responsibility of directing the Company's principal activities in applied research and development in the broad field of electronics. In the war years Dr. Russell, on leave from Columbia, served the government through participation in the National Research Defense Committee and as an expert consultant to the Office of the Secretary of War, receiving civilian awards in recognition of his contributions. . . . A letter from **Max Parshall** dated last August from Fort Collins, Colo., gives us some news of his own activities as well as those of classmates. Max writes: "I'm enclosing a program of Mechanics Conference in which **I. K. Silverman** took a part. The coauthor made the actual presentation. I had a very short visit with Silverman. He said that he doubted that he would be at the Reunion next year. He said that he was having a good time teaching at Colorado University at Boulder after retiring from the Bureau of Reclamation, Denver. He also said that he had recently returned from Europe. I am retiring after spending part of every year, as student or employee, for 47 years on this campus (Colorado State College). I have worked for the State of Colorado continuously for 38 years. Pension-wise, further employment will do me no good; and if I were careful with the arithmetic and tax rates, I might show that it would cost me money to work. Marg and I plan to travel over the

western states intermittently until January 1, 1968. Then I will come back to teach surveying, water supply and sanitation until next June. We will come to 40th Reunion if health permits. We plan to try for a salmon in the northwest in October and then go as observers on a wild turkey and deer hunt in Wyoming during November. Best wishes. P.S.—**C. A. Armstrong** and wife were here for a long week-end last December. Maida was very ill in June but was recuperating on Cape Cod, where Cole is working this summer (Woods Hole)."

A note from the Department of Health, Education and Welfare tells us that **Sam Weibel** retired on June 1, 1967 after a 38 year career in public health, and that he received the U.S. Public Health Service's Commendation Medal. Sam has been a sanitary engineer at the Robert A. Taft Sanitary Engineering Center in Cincinnati since 1939, and was awarded the Commendation Medal "in recognition of his pioneering efforts in research and investigation in the fields of water supply, waste treatment and, most recently, waste collection." Albert H. Stevenson, Assistant Surgeon General and the Public Health Service's Chief Engineer, presented the medal in ceremonies last June. During his 29 year career as a Public Health Service officer, Sam Weibel achieved international fame in water pollution circles for his work on septic tank systems, storm water run-off and chlorination disinfection. He is retiring as Deputy Chief of Engineering Activities in the Federal Water Pollution Control Administration's Cincinnati Water Research Laboratory. He is a Sanitary Engineer Director in the Public Health Service's Commissioned Officer's Corps, a rank equivalent to that of captain in the U. S. Navy, and has been assigned to duty with the Federal Water Pollution Control Administration. Sam began his career as a sanitary engineer in 1929 with Clyde Potts Associates, consulting engineers in New York City. He joined the Public Health Service in 1939. Sam lives with his wife, Lucille, at 3248 Glengyle Ave., in Mt. Lookout, a suburb of Cincinnati. They have two children, Rod Weibel, and Mrs. Elsa J. Warner.

At the 1967 Eastern Analytical Symposium, cosponsored by the American Chemical Society in November, **Walter J. Smith** of our class and of Arthur D. Little, Inc., discussed the subject "The role played by small airborne particles in sparking the toxic action of other substances." About 4,000 analytical chemists attended the three-day program. . . . And finally, we publish a note received November 12 by **Jim Donovan**: "Enclosed is check for \$50 as a contribution to the anonymous fund for possible aid to classmates to get to the 40th Reunion. The thought that some might not be able to come for that reason sort of touched me and I am sending this before I forget. If you need another similar con-

tribution for this purpose, please let me know." This letter was signed by "Ed." We hope other classmates follow this example.—**Hermion S. Swartz**, Secretary, Construction Publishing Company, Inc., 27 Muzzey St., Lexington, Mass. 02173

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Christmas greetings from **George Meyers** and Barbara arrived in the form of a nice Christmas letter postmarked P.O. Box 3914, Kampala, Uganda, East Africa, and we would like to pass it on to you. The Meyers write, "Unless you have been to East Africa or tried to get a package delivered to this part of the world, you have no idea how far from home one can be! We miss our friends and are eager for news, but due to much work and many small crises (which come under the heading, "But this is Africa") we ourselves have not been able to do much more than stay even with what is going on in our immediate family. We hope this letter will assure our friends and relatives they have not been forgotten. First, about the boys: George, 3d, is now a Captain, U.S.A.F., still active in regional communications emanating from Fuchu Air Base, Japan. Robert, Lieutenant, U.S.A.F., finished a tour of duty in South Vietnam, and married Ruth Hoffman in Bangkok on September 8. He is now with 315 Air Division out of Bangkok. Bradford, Lieutenant, U.S.M.C., is still training on helicopters at Whiting Field, Florida. William graduated from Bucknell in Electrical Engineering. He is with I.B.M. at Endicott, N.Y." The excitement peaked up last November when George started a six weeks scramble to get into Africa by January 17. He closed out his work at Nuclide, packed as much stuff for storage as he could, arranged to send what he could to Africa, and took off in a breathless state. That was nothing to what faced Barbara! She had to turn off her real estate activities, close a house that had collected everything for 18 years (including dinosaur bones) and prepare it for renting. What do you do with your husband's amateur radio? However, with the loving help of Bill, Brad, friends at home and at the office, she made it to Africa July 18, totally exhausted. "For those who are not cognizant of why we are here: George's firm is M.A.B. Associates of Washington, D.C. They are under sub-contracts to two large investment banking groups in New York. These have a direct contract with U.S.A.I.D. to encourage the investment of private capital in Africa. George is Area Director and Investment Advisor for East Africa. The work consists of spotting an opportunity; setting up an operating plan to prove and insure viability; planning the staff, equipment and financial structure; getting the project going; and finally monitoring it sufficiently to give the investor the assurance of continuity and knowledge of current con-

ditions. The hardest part is obtaining fiscal and managerial responsibility. There is a great need here for American business men and American methods. Believe it or not, the weather is absolutely marvelous—cool enough for blankets at night. Even during the rainy season one can play tennis almost every day. We are thriving. African economies will progress fastest under incentives, not restrictions. No incentive is greater than 'Peace On Earth, Good Will To Men.' " Thanks to George and Barbara and best wishes to you in Africa.

November first was the retirement date for **Erling S. Mathieson** of Cutler-Hammer, Inc., of Wisconsin, after a 38-year career with this internationally known manufacturer of electrical and electronic equipment. Erling's progress in the company included work in the Engineering Department, the Standards Department, the Small Motor Switch Department, Assistant Works Manager, and since 1959 he was Vice President in charge of manufacturing. . . . We had previously reported (February, 1966) that **Anthony Standen**, Executive Editor of the Encyclopedia of Chemical Technology, was busy working on the Second Edition, and we note that this has now been published by the Interscience Publishers, division of John Wiley and Sons, Inc. . . . An announcement of the merger of Tide-water Oil Company and Mission Development Company into Getty Oil reports that **Heinn F. Tomfohrde, Jr.**, will continue his position as Group Vice President for marketing, manufacturing, transportation and finance. . . . We were saddened to hear of the death of Lt. Col. **John F. Lucey** of Bronxville, N.Y., on November 10, 1967; and **Norman Earle** of West Boxford, Mass., on November 18, 1967. We extend our heartfelt sympathy to their families. . . . Kindest regards to all.—**John P. Rich**, Secretary, P.O. Box 503, Nashua, N.H. 03060

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The variation in flow of material for the Notes is at least as unpredictable and inexplicable as that of the Dow Jones Average. It is very pleasant to be able to report a recent surge in this flow to a new high level; so high in fact, that it becomes possible to hoard a certain number of items for the leaner days ahead. I hope that those of you whose communications are being temporarily "banked" will be patient. . . . **Hank Luykx** has joined the ranks of the retired. His activities since graduation include 11 years at N.Y.U. College of Medicine as Instructor, Assistant Professor and Associate Professor of Preventive Medicine, primarily teaching biostatistics; several years of graduate work at Johns Hopkins School of Hygiene and Public Health; and three years in the Navy during W. W. II. After the war he spent two years with the N.R.C.

as a biometrician for the Atomic Bomb Casualty Commission in Hiroshima. During the past 16 years he has been Chief of the Biometrics Division, Office of the Surgeon General, Headquarters, U.S.A.F. in Washington. The Luykx's older son Peter is an Assistant Professor at University of Miami and the father of two daughters. Younger son John graduated from Bucknell and is about to begin his military service. Daughter Elizabeth is married and lives in Maryland. Hank's prescription for retirement sounds inviting "My wife Barbara and I have now moved to Saint Michaels, Md., a small town on the shore of Chesapeake Bay. I expect to be occupied exploring these shores in my sailboat, puttering about the house, delving into the history of Maryland, giving advice, both professional and unprofessional, and enjoying life. The projects are endless; I don't know where I will find the time." . . . **Adolph Hugin** is practicing patent law in Washington. After graduating from M.I.T. he obtained a J.D. from Georgetown University Law School, an L.L.M. from Harvard and an S.J.D. from Catholic University of America. He taught at C.U.A. Law School for several years as a visiting professor in various subjects. He was Editor-in-Chief of the American Patent Law Bulletin from '49 to '54, and has been active on various committees of the American Patent Law Association and American Bar Association, as well as in a large number of Catholic lay organizations. In addition to obtaining patents for others, he holds some 10 patents on inventions of his own in various fields.

Langley Isom works for Reeves Brothers Inc., in New York and is involved in technical administration and new product development. The Isom's daughters, Anne and Elizabeth, are both married and have presented the Isoms with seven grandchildren. . . . As many of you know, **Sidney Kaye** is President of Suffolk Grocery Company in Boston and a past president of the M.I.T. Stein Club. He is also a Trustee of the Brookline Public Library, Emerson College, the Jewish Publication Society of America, Boston Rotary Club Foundation and Beth Israel Hospital. He recently started his 27th consecutive year as a volunteer orderly at Beth Israel. The Kayes will presently take off for a visit to their older daughter Sylvia who is married to Dr. Stanley Bohrer, Chairman of the Department of Radiology at University Hospital in Ibadan, Nigeria. Sidney reports having seen **Saul Sigel** and **Morris Shaffer** in recent years. . . . **Paul Kimberlin** does engineering work relating to materials handling equipment for Inland Steel in East Chicago. The Kimberlins live in Chesterton, Ind., where Paul is a member of the Town Planning Commission. They have a son Kenneth who, some of you may remember, accompanied his parents to the 35th Reunion. . . . **Frank Hankins**

writes that "after 15 years with Pan American Airways as pilot and operations manager, Atlantic Division; 14 years with Curtiss-Wright Corporation as Vice President of the Engine Division; and five years as Manager of Technical Services for Lockheed at Idlewild" he has retired to his home in Franklin Lakes, N.J. . . . **Ed Pritchard** is presently Deputy Project Manager of Project Mallard (D.O.D.—Army) a four-country tri-service, long range, tactical communications system. His son is completing work for a Ph.D. in physics at Harvard/M.I.T. and his daughter, who graduated from Radcliffe, is doing computer programming in Washington.

John Newsom is Central Florida distributor for Kendall lubricants. He served eight years as Orlando City Commissioner. He is now semi-retired and spends much of his time on his houseboat, hunting and fishing. . . . We have received notification that one of our classmates has passed away, **George Schaible** in Clearwater, Fla., on September 26, 1967. Unfortunately, no further details are available. . . . Changes of address: **Maurice W. Mayer**, Lamas Tower, Apt. 1804, 2929 Buffalo Speedway, Houston, Texas 77006; **Charles A. Smith, Jr.**, 100 Pearl Street, Framingham, Mass. 01701.—**Gordon K. Lister**, Secretary, 530 Fifth Avenue, New York, N.Y. 10036

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A most welcome letter from **Horst Orbanowski** has brought me up to date on him and his family. Horst wrote: "My oldest daughter Anita (Antje) is married to Frank Segaline and is living in Wallingford, Conn. She has a son, Tywain, one year and nine months old and is expecting her second child in December. She attended Skidmore College and has her B.S. from the University of Bridgeport. My second daughter, Jutta, is married to David Hoagland and is living in Stamford, Conn. She has two daughters, Kristina four years old and Karen six weeks old. She has an A.B. from Syracuse University and an M.A. from the University of Bridgeport. My son, Kurt Peter, graduated from Dartmouth College with a major in Physics. He is now doing graduate work in engineering mechanics at the University of Pennsylvania and expects to receive his M.S. in December 1967. He intends to continue his studies towards a Ph.D. in mechanical engineering.

My wife, Annelotte, is doing fine. She is kept busy with housework and looking after the expanding family. I thought that with the children on their own she would be able to lead a life of leisure but apparently a woman's work is never done. At my ripe old age, I decided to go back to school several years ago, and received a Ph.D. in mechanical engineering last June from the Polytechnic Institute of Brooklyn. I am still with my old company, the

Kurt Orban Company, Inc., in Jersey City, N.J., as Vice President in charge of the Technical Service Department. I spend about half as much time commuting as I spend in the office, but one gets used to that (Sec. note—Amen). For two years I was on a leave of absence from my company and acted as a consultant to M.B. Electronics in New Haven, which had acquired a German manufacturer making dynamic balancing machines, whom we formerly represented. My main hobby is still sailing. I have transferred my sailing activities from Larchmont, N.Y. to Southport, Conn. to have more and better competition in the Atlantic Class. In the winter I do a little skiing and play tennis as long as the courts are open so as not to completely deteriorate physically.

Charles Loucks writes "Although retired, I find that there is not sufficient time available for me to do all of the things I want to do. In April 1967, Mrs. Loucks passed away after several years of illness, resulting in some readjustments for me. I occasionally visit members of my family in California and my daughter and her family in France. My son and his family live nearby in Arlington, Va. . . . **Claude Machen** made the headlines lately when his company, Boston Gas, broke ground to construct a new gas storage plant. . . . **Larry Lovett** was recently elected Clerk, Treasurer of Deran Confectionery Company, Inc. . . . **Metal-Working News** had an interesting interview with **Gordon Brown** a few months ago when Gordon enlarged upon the statement—Scratch a new engineering graduate and you'll find a composer and arranger, a custodian or an interpreter. . . . The University of Washington's *The Trend in Engineering* for July, 1967, had an article which is must reading for engineers entitled "Nurturing Professionalism" . . . **Dave Bernstein's** company, American Bilrite Rubber Company, Inc., has entered into an agreement for the purchase of all the outstanding stock of Noxon Mills, Inc., Dalton, Ga. . . . Incidentally, our class is well represented on the U. S. Department of Commerce's Technical Advisory Board by **Dick Kropf** who was recently re-appointed for another term.—**E. S. Worden**, Secretary, 35 Minute Man Hill, Westport, Conn. 06880

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So many classmates are traveling around these days that if the rest of us just report in these columns now and then where we are, someone is sure to drop by and say hello. . . . Found out more about that ocean trip that **Rolf Eliassen** and his wife were preparing for in September. He is taking a sabbatical leave and started with a cruise to Honolulu, Tokyo, Manila, Australia, New Zealand and the South Sea Islands. Will find out and report where he will be after he returns. Rolf is a professor

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at Stanford University and a Resident Partner of Metcalf and Eddy, Engineers, working in the field of environmental controls for the air, land, and water environment. . . . **Elton V. Buckley** sends the following information about his new location and invites those who live or travel near to get in touch. "In March, Bridgeport Brass Company, with whom I have been associated for 27 years, moved part of their operation from Bridgeport, Conn., to Altavista, Va., a small town near Lynchburg. A beautiful new plant, called the Piedmont Manufacturing Company was built, and my title is Chief Chemist. My wife and I have enjoyed living in Virginia very much and only regret moving so far from our daughter, son-in-law, and our grandsons, Timmy and Wally." Elton's address is 1604 Avondale Drive, Altavista, Va. . . . **Norman D. Schulze** is Plant Engineer with Sprague Electric Company and lives at 55 Marion Avenue, North Adams, Mass. Norman is Chairman of the North Adams Redevelopment Program which is now in the midst of a big building project. Daughter Meredith Schulze Farley, a graduate of Skidmore College and Katherine Gibbs, is living in Montreal where her husband is a civil engineer with the Bechtel Corporation. Daughter Jane Schulze Gille, a graduate of San Jose College, is teaching 1st grade in Santa Rosa, Calif., where her husband is a hospital technologist. Son Richard is a junior at Johnson College in Vermont.

Phil T. Boothby, 2d, writes, "I have spent the past 28 years as a civilian engineer with the Navy Department at the Portsmouth, N.H., Naval Shipyard,

where I am Director of Design, Public Works Department. I live at Post Road, North Hampton, N.H., in the winter, and Bridgton, Maine, in the summer. Luella and I have two very lovely teenage daughters, one studying for a degree in law at University of New Hampshire and the younger about to start in the pre-veterinarian field at the same university. Both are fine students and well oriented all-round, out-of-doors girls. We are extremely proud. In the future—just a few years more—Luella and I will start to poke and pry around a few corners of this earth—between summers at Bridgton, Maine, naturally." . . . **F. Rolf Morral** planned to be in Mexico City in January, and expects to visit his son John Eric, who is working for his Ph.D. at M.I.T., in June. Rolf is Director of the Cobalt Information Center, Battelle Memorial Institute at Columbus, Ohio. He is Chairman of A.S.M.'s Inter-American Relations Committee and has been nominated "Academico Corresponsal Extranjero" to the Real Academico de Ciencias Exactas, Madrid, Spain. He is also Treasurer of the Columbus Technical Council. . . .

Charles B. McCoy is now Vice Chairman of the Executive Committee of the Du Pont Company. Du Pont's Executive Committee is charged with running the day-to-day operations of the company, so in his new position, Charles will be Number 2 man in Du Pont. Charles has been a vice president, director and member of the Executive Committee since 1961. He started with Du Pont in 1932 as a cellophane machine operator and has since worked as chemist, sales director for the explosives department, and general manager of both the elastomers and explosives departments. . . . We have a change of address on **Thomas H. Jenkins** to Bechtel Corporation, Pipeline Division, 220 Bush Street, San Francisco, Calif. When we last heard from him he was in Paris, France. New address for **Alan B. Fisher** is Fisher and Davis, 825 E. Speer Blvd., Denver, Colo.; and for **Miguel A. Sastre**, 86 Slaud Street, Ponce, Puerto Rico, 00731. . . . Twenty-two members of the class from the New England area got together for dinner on November 30, to congratulate **Robert B. Semple** on his election as a Life Member of the Corporation of M.I.T., before its November meeting. Bob is the first of our class to become a life member, and it is a great honor to him and to our class. The evening had a reunion atmosphere and all had an enjoyable time. We hope other sections of the country will find similar occasions for regional turnouts which generate such enthusiastic response.—**Elwood W. Schafer**, Secretary, Room 13-2145, M.I.T., Cambridge, Mass.

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35th Reunion; Chatham Bars Inn; June 7-10, 1968; for reservations: James Turner, 233 North Main St., Meadville, Pa.

As you read these notes it will be very close to our 35th Reunion; four months to be exact, and that is not much time. The major idea behind any such reunion is that we all get the chance to see and visit with one another. I would personally like to see several fellows who have not been around recently, not to mention many who do get to reunions, but from whom we never seem to hear directly. **Frost Andrews** and **Bob Winters** will most assuredly be present. Another later class will also be at the Chatham Bars Inn, but we are favored by our seniority. The Inn is a large place and there is plenty of room for the two classes. Far from incidentally, I have uncovered a few more copies of the September interim letter, for those who would be interested. . . . **Chuck MacMillan** sends news that Sue Larson of Rock Island, Ill., is to become the bride of Calvin MacMillan, Chuck and Helga's son. The lovely Sue is a graduate of the University of Illinois, and Calvin is now in his third year of medical school at Western Reserve University, Cleveland, Ohio. The couple will reside in Cleveland while Calvin finishes his studies. Sue will be doing recreational work there. Chuck returned from San Francisco a month before the Alumni Officers' Conference. No good, Chuck, a month is as bad as nine years.

Now comes **Cal Mohr** who reports that **Otto Putnam** retired from Althouse Chemical Company on September 15. Cal talks with **Adam Sysko**, though does not often see him. Skee is with DuPont. Cal enclosed a press release concerning **Richard Morse**, Professor in the Sloan School, who is Chairman of an anti air pollution panel. It appears that Dick has not yet solved this problem. We are told that the electrically driven car is not the answer (it occurred to me that we should give a thought to the country's largest industry before manufacturing too many electric cars.—Sec.), and that what is needed is "a multi phase, multi agency federal attack" to reduce the amount of air pollution from internal combustion engines. Now we are getting someplace! Actually there are quite a few hard working agencies attacking this pollution problem, many of them private. This appears to be of interest to so many of our readers that John Mattill, Editor of *Technology Review*, will soon run a longer separate article on the subject and the Committee. Cal says that he was the only 1933 man at the recent large meeting in Chicago where President Howard W. Johnson was the principal speaker. Well, folks, Cal gives us something to be proud of. I wish that all classes were fortunate enough to have men like Cal Mohr.

J. Frost Andrews gave me some news about his finally getting settled. He and Jermaine are living in a rented home in Princeton, N.J. It appears that Jack's office has been moved. Living in several homes and having a new official location does not appeal to Jack. Last summer he did some traveling in a

camper. He went to Ontario and to the Expo '67. The Andrewses recently went to an Alumni Center meeting in New York City, and enjoyed it very much. They saw Isabel and **Ed Goodridge**. Jack wonders how one goes about getting to a convention in Hawaii. I would like to know too. In closing, Jack says that Jermaines's daughter is attending Wheelock, and that his two daughters are fixing up an apartment in Boston. One is a nurse, and the other is a secretary. Although Jack is getting used to Princeton and enjoys being involved in Princeton affairs, he is still, and will always be, an M.I.T. man.

Now comes a rather long newspaper article and a letter from **Newton W. Buerger**. Newt has retired from the U.S. Navy Postgraduate School. He has been a Professor of Metallurgy and Material Science at the Navy School since 1942, when he joined the school as a Naval Reserve Officer. Upon his return to civilian life he was appointed Associate Professor of Metallurgy and was made a full Professor in 1949. He received all of his degrees from M.I.T.; bachelors in 1933, and masters later, leading to his doctors in 1940. Newt is a member of the Geological Society of America, a Fellow in the Mineralogical Society, and is a professional engineer in California. He is also a member of the Crystallographic Society, the Geochemical Society, and the honorary scientific fraternity, Sigma Xi. He has served as consultant with many enterprises, including several in Ontario and Quebec. Upon retirement from the Naval Civilian Service he will take up a position as Chief Metallurgist with Viking Metallurgical Corporation in Verdi, Nev. Viking is engaged in the manufacture of certain parts for N.A.S.A. space vehicles. The Buergers have bought a condominium at Lake Tahoe. It has its own boat and marina. They still retain their house at Pebble Beach, which looks out over three golf courses. The Buergers have two children. Brenda, who was a United Stewardess before she went to Hawaii and married, now has boy and a girl of her own. Chip (Newton, Jr.) graduated from the Naval Academy in 1958, and flew until 1963. He then went into naval intelligence; took his M.S. from George Washington, and is presently an assistant professor at the Defense I School in Washington. Newt avers that the work at Viking is most interesting and challenging. They are involved in the making of forged alloys of exotic metals and superalloys used in the new S.S.T. parts of space ships and submersibles.

Now here is a Course II man, **Roger L. Putney**, who is currently Chief of Technical Laboratories at Quincy Division of General Dynamics Corporation. The laboratories cover nuclear water chemistry, atmospheric analysis, hydraulic oil cleanliness, metal analysis, cleaning and pickling, tank control checks, metallography, metallurgy,

ultrasonic test training and research, calibration coordination, and process control procedures. He says, "Margie and I are very proud of our daughter, Marilyn, who expects to start college next fall; goal, dental hygienist. My current hobbies are color photography, and touring in our medium size camper." . . . We have a short note from **Frank Heselton** who plans to make his trip to the Reunion a time for visiting relatives and friends. Friends will be interested to know that Ruth is past any worry over her health, and is getting back into some of her athletic activities. Frank is now a grandfather. . . . We have a mention of a classmate in the *Wall Street Journal*. He is **U. V. Solmssen**, who has recently been made President of the Nepera Chemical Company, a division of the Warner-Lambert Pharmaceutical Company.

Billy Moore, President of American Oil Company of Chicago, gave the commencement address at the Institute for Management, Northwestern School of Business, Evanston, Ill. Here it is impossible to include more than a bare synopsis, but if anyone would like a copy I will see that he gets it via return mail. The theme of Bill's address is built around his proposal that middle management be encouraged to assume a far greater role in the total urban problem. The managers, he said, are a large, talented, creative group of people who are the normal source of ideas; who have the skill and knowledge to turn ideas into innovations, and who have ability and determination to carry them out. "We need to consider the benefits to be had if we could elevate to the level of the more affluent average, those in our society who are poor because of environmental, cultural, and social factors that they, alone, cannot improve." Bill said further that it is a very healthy thing that many of our senior executives are becoming involved in solving social problems. He added that executive leaders tend to think of the problems on far too grand a scale because "What we need is a climate in which more people of the middle management group will consider as a part of their responsibilities, and study the ways in which their particular skills and talents can be used to attack the many elements of the problem one piece at a time." Bill finishes with "I have no apologies to make for the contributions that business and industry are making, as the fact is that our economic system has yielded the highest standard of living in the world, and even the most impoverished among us are more fortunate than most of the people in most of the nations of the world. But, it is no comfort to a discouraged, frustrated, even desperate Negro in Detroit or Chicago to know that he would be worse off in Nairobi. I think that we can do it if we really decide that we want to, and get the right people in our companies actively involved." . . . **Arra Steve Avakian** has just received the

A.S.A. Sarafian Award for 1967. The Sarafian Award is given to "that Armenian who has made the most exceptional contributions to his community and has demonstrated outstanding citizenship." We congratulate you, Steve. . . . Now we come to the Alumni Fund's capsule biographies. **Warren S. Daniels** has moved from Champaign, Ill., to Washington, D.C., to start his new job as Chief of the Planning Section, Water Resources Division, of the U.S. Geological Survey. Warren and Dorothy have three sons: Roger, M.S. Kansas State, now with General Electric in Phoenix; Glenn, a 2d Lt., U.S. Army, Vietnam; and David, a freshman at V.P.I. Dorothy is currently teaching pre-primary in Alexandria.

Our foreign office man in St. Louis, **Ellis Littmann**, has been tracking down a suspect, one **Alfred G. Payne**. Al is presently with Monsanto Chemical and has lived in St. Louis about two years having been transferred from Springfield, Mass. He has been with them since 1939. Before this he was with the Cottrell Company, manufacturers of printing machinery, 1933-1939. The Paynes have two married daughters, one whose husband is working on his Ph. D. at Kansas University, and the other whose husband is working for General Electric at Pittsfield, Mass., Turbine Division. The Paynes miss New England which is natural, but are becoming adjusted to the Midwest. One of Al's hobbies, the most important to him, is gardening. Their suburban home was chosen because of the pond there, and the chance Al will have to do some extensive gardening. The Littmanns have a granddaughter, Lisa Littmann. . . . November 1, my wife and I returned from Honolulu, by train and ship. The train ride was the all daylight ride in the vista dome cars, from Salt Lake to Denver, via the Western Pacific and the Denver, Rio Grande and Western Railroads. Any more spectacular sights would be hard to imagine. Never pass up a chance to take this ride. . . . **Francis T. Hall** writes that he has retired as Professor of Electrical Engineering at Penn State, and is now Assistant Dean in the Boston University School of Engineering. . . . **Richard E. Payzant** has been with the U.S. Army Corps of Engineers for 33 years. He says, "Have completed assignment as Deputy Resident Engineer, Launch Project Complex 39, Cape Kennedy, from swamp rattlesnakes in 1963 to First Launch in November 1967. Will transfer to Huntsville, Ala., in January 1968 to work Nike Project." . . . **Beau Whitton**, Vice President of the Class assures us that he and Daphne will surely attend the 35th Reunion in June 1968. . . . We have an address change from **Bill Pleasants**, who is living in Bethel Pa., on Main Street. . . . **Art Hungerford**, of broadcast fame, is in a different house at Penn State College. . . . As you know, all addresses are available for the asking. That about covers it for this month.—**Warren J. Henderson**, Drawer H, Fort Rock Farm, Exeter, N.H.

Two newsy letters provide the basis for this month's notes. From **Jack Colby** we received the following: "While I am in Milwaukee for a Directors' Meeting and have a secretary available, I will take advantage of it and give you some news. On my way from Wisconsin to Florida this fall, via Canada and New England, I had a chance to see a few of the boys. Just before leaving Milwaukee, Priscilla and I had dinner with **Jack Ballard**, who had returned from a fishing trip in Montana. Jack has sold his interest in the Sterling Company, of which he was President. I don't know whether you would call him semi-retired or not, as he seems to be keeping fairly busy doing some special work for the Northwestern Life Insurance Company. Coming down from Canada, I stopped off at Dartmouth College to see my oldest boy, who had just returned from two years in the Peace Corps in Africa. While there we had lunch with Stocky. Following lunch, we went across the river in Vermont to see his lovely house, high up on the mountain side. Both Stock and his wife were in fine health and good spirits. On my way south, I stopped off in Richmond and had lunch with **Carson Brooks**. He is as fat and good-natured as ever and has just returned from Chicago, after delivering a paper on the welding of aluminum. He gave me a copy to read but it was so complex, I couldn't understand a word of it. My last stop was in Greensboro, where I had lunch with **Ed Lowenstein** in his beautiful home. Ed is as busy as ever with his architectural firm, and also on local M.I.T. activities. He had spent six weeks of the summer in Europe."

Allan Mowatt reported on his West Coast journey with: "On my California trip Doreen and I spent our first night out with **Gerry Rich** and Verna at their lovely home in Santa Cruz, Calif. We chatted at length about Gerry's new enterprise, Rich Laboratories, Inc., which he was just organizing. He has a couple of 'winners' for products. I went to a luncheon of the Licensing Executives Society at their convention in Palm Springs, and discovered I was sitting across from **Alfred Johnson** who handles licensing for Arthur D. Little. Imagine going that far to see a classmate only 20 miles away at home! Anyway, the next night when the convention closed, the two of us with our wives had dinner together. Incidentally, both Al Johnson and **Syd Grazi** had net 72's on their consolation round match in the Class golf tourney, but Syd won by virtue of playing on a course with a U.S.G.A. rating one point higher than Al's. . . . Do you look up classmates when you travel? If so why not drop us a line so we can pass on the greetings.—Co-Secretaries: **Phoenix N. Dangel**, 329 Park Street, West Roxbury, Mass. 02132; **Irving S. Banquer**, 20 Gordon Road, Waban, Mass. 02168

Classmates of M.I.T. '36 will be saddened to hear that Class Secretary, **Alice Hunter Kimball**'s husband Dr. George E. Kimball passed away suddenly on December 6, 1967 while participating as a member of the Chemistry Department Visiting Committee at Carnegie-Mellon University in Pittsburgh where their daughter, Martha S. Kimball, is a junior. I am sure all of you join Ben Fogler, your pinchhitter for preparing these class notes, in expressing our deep sympathy to Alice for her loss. . . . Col. **Aldo H. Bagnulo** writes that after 29 years in the Army and two years as a civil servant he has left government service and joined the engineering consulting firm of Pope, Evans and Robbins as Associate Partner in charge of their Washington, D. C. office. Aldo reports his oldest son graduated from V.M.I. last June and is now a Second Lieutenant in the famed 82nd Airborne Division. His other three sons are at the University of Florida, Penn Military College and at Fort Hunt High in Alexandria, Va. . . . **Charles Milone** has been appointed as Director, General Products Development, Goodyear Tire and Rubber Company, Akron, Ohio. . . . **Sidney Cornell** has taken on new duties at Epsco, Inc., Westwood, where he is now Assistant to the Vice President of Engineering.

Lawrence Kanters sends some interesting notes about his life in Pittsburgh where he holds down a key job in merchandising of all apparel at Kaufmann's, a division of the May Department Stores. Larry says after 13 years Pittsburgh is getting to feel like home. His business travel has enabled him to indulge his New England acquired love of skiing and sailing, most recently by skiing in Japan, Sweden, France and Switzerland. His oldest boy, Jim, is a lieutenant in the Air Force; his two girls are in school in Boston; and his youngest boy, Benjamin, is finishing up high school. . . . A news note reports **Arnold Kruse** as still with C. H. Plantation and enjoying the good life on Maui. With winter hard on us in much of the U. S. Arnold's problems sound pretty easy to take. . . . A fascinating release brings news of **William P. Kennedy** being advanced to the post of Director of Commercial Aircraft Analysis for the Lockheed Aircraft Corporation. Bill has been doing some exciting operations research work on airline system simulation and will have in his new job prime responsibility for pinpointing the wants and needs of the transportation market, assessing who and what will be traveling where, and how. After working with Martin, Curtiss-Wright and Boeing, he joined Lockheed in 1949. Before taking on his new duties he had been developing economic data for the airlines, the U. S. Government and Lockheed on the S.S.T. and its application to air carrier operation. Sounds like Larry is riding a real sonic boom and we wish him well in his new tasks.

Also in airline news is the fact that **W. Boynton Beckwith**, Manager of Meteorology for United Air Lines, has been elected President of the Chicago Chapter of American Meteorological Society. He also spoke at the Denver Chapter of this same society on one of his, and we as airline passengers, greatest concerns, "Fog Dispersal: Past Present and Future." Here's hoping you solve that one, Boynton. . . . I suspect your pinch hitter can hardly fail to give you a bit of lowdown on himself. For two years now I, **Ben Fogler**, have been functioning as Personnel Director for the Management Services Division of Arthur D. Little, Inc. The finding of high quality professionals is proving to be one of the largest challenges I have undertaken at A.D.L. in 28 years with the firm. Last February I spent ten days in Bangkok, Thailand, investigating a major consulting task A.D.L. had been asked to consider undertaking. Two of my children are married and three delightful granddaughters have arrived to brag about. . . . Do send news of yourself to—**Alice H. Kimball**, Secretary, 20 Everett Avenue, Winchester, Mass.

Jerv Webb, President and General Manager of the Jervis B. Webb Company, Detroit, Mich., has been elected a Fellow of the American Society of Mechanical Engineers. . . . **Curt Powell**, a Professor at the Institute, is the editor for the revision of the book *Marine Engineering*. . . . **George Coleman** has been reelected Chairman of the Education Committee at Dickinson College, Carlisle, Pa. He is also serving his 41st year as Chairman of the Southboro, Mass., School Committee. . . . **Margaret Mace Kingman** has resigned from the Control Intelligence Agency in Washington after 23 years service as Intelligence Officer. She spent 1965-67 "retooling" in geography at the Clark University Graduate School of Geography, and is currently Associate Professor, Division of Area Studies and Geography, State University College, New Paltz, N. Y. . . . **Mel Prohl**, Manager of Mechanical Design, General Electric Company, Lynn, Mass., has been heavily involved in the design and development of steam turbine components during his whole career with G.E., which began immediately upon his graduation from M.I.T. His main area of technical contribution is in rotor dynamics and bucket vibration response. Mel has also recently been elected a Fellow of the American Society of Mechanical Engineers.

Stan Zemansky has joined the Martin Marietta Corporation's Aerospace Group as Director of Materiel. In his new post Stan will be responsible for development and administration of policies, procedures, and controls affecting aerospace materiel activities. He came to Martin Marietta from T.R.W. Systems Group, Redondo Beach, Calif., where he

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was Manager of Materiel for the Electronic Systems Division. He entered the aerospace field in 1937 with North American Aviation and spent almost 25 years in key materiel management assignments for that firm, after which he was Vice President of Administration for Killman Instrument Corporation, Elmhurst, N. Y., and then Director of Materiel for Litton Industries' Guidance Control Division at Woodland Hills, Calif. . . . **Ed Mosehauer** is Program Manager with the Hamilton Standard Division of United Aircraft Corporation, Windsor Locks, Conn. Ed also has been the West Hartford School Board Chairman since 1965 and a member since 1960.—**Robert H. Thorson**, Secretary, 506 Riverside Ave., Medford, Mass. 02155; **Prof. Curt Powell**, Assistant Secretary, Rm. 5-325, M.I.T., Cambridge, Mass. 02142; **Jerome Salny**, Assistant Secretary, Egbert Hill, Morristown, N. J.

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30th Reunion; Chatham Bars Inn; June 7-10, 1968; for reservations: Armand L. Bruneau, 150 Broadway, New York, N.Y.

"Linda is now a freshman at M.I.T. studying math." reports **Vernon Lippitt**. "From her letters she would seem to be enjoying Tech immensely, and finding time for Outing Club trips on weekends, and square dancing also." When she was at home for her Thanksgiving vacation, Linda Lippitt was interviewed in a feature article for the Rochester newspaper, and the reporter concluded, "No one can say Linda Lippitt is taking any 'basketweaving' type courses!" One of 53 girls in the Class of '71, Linda is taking the Freshman Humanities Option that is taught entirely in French. And she rounds this out with a couple of electives: number theory and nomography. Asked about social life, she said, "It's good. There are lots of good events. Quite a number of the Tech men, as they are called, are glad to date the girls at school. Others scorn them. And we in turn scorn that type. We have lots of fun." Describing the rest of the family, Vernon continued, "John is a high school junior, out for football and swimming and a member of the math and radio clubs, and National Honor Society. Peter and David are wound up in school, scouts, church youth, and this year a new-found interest in soccer. In addition to running the home, Ruth manages one day a week as a nurse school teacher, has done some research for the guidance office at Brighton High, and is on the Y.W.C.A. Board." This started with our invitation to Vernon as Professor of Business Administration at the University of Rochester, to forecast the economy for 1968! "I don't really have to make up my mind on the business outlook until December 11, when I am scheduled for a public presentation at the Executive Seminar. While I don't foresee a de-

cline in the next year, some of the current forecasts of eight-nine per cent rise in G.N.P. seem over-optimistic to me. Last summer I wrote a draft of a long-delayed book on business sales forecasting, which could be encased in hard covers during the next year. In addition to school work I keep busy on the Scout Troup Committee, on Official Board on the Education Commission plus Presidency of Methodist Men at our church, in sports at the University and at home, and in assorted lawn and household chores. Just a typical suburbanite!"

Patience if you're chewing your nails about the fate of your Reunion, Tenkoku! You are just reading the Symbol Contest announcement as this column is being written, and we too are holding our breath. What is important in Tenkoku is not skill, but whether the work incorporates elegance. What could be more elegant than Chatham Bars June 7-9, and Cambridge on the 10th? Whether the muse came to you or not, have you arranged your schedule to be at Reunion XXX! There is still time to add an exhortation to your Christmas Card acknowledgement note, and to encourage your friends to join you there. Without you what would they do?

Hal Strauss, in his sweep to spread the news about Reunion reports to **Don Severance** from Japan, "Met Professor F. Saito '52, in Tokyo, but too short notice for the others on your list. I am beating the paddies for '38 men. Suggest this picture of the Tokugawa castle in Kyoto be the model for a new dorm!" . . . **Loring Schutz** is chief Design Engineer, Pearl Harbor Naval Shipyard, and former Chairman of the Hawaii Section, Society of Naval Architects and Marine Engineers. And continuing the roundup of garden spots, "Palm Springs is as beautiful as ever!" writes **Nettie Kibur**. Retired five years ago from the Boston Health Department because of a fractured hip, Nettie has been engaged in volunteer work at the Palm Springs Desert Hospital.

Mahlon Winter advises, "We have entered into the fascinating business of investments with a new company—Capital Growth of Southern California! In 1967 also we acquired an Alberg 30-foot sloop, which we named the *Merrie Sea*. You sailors may like to know that **Jack Wood** is with us at the San Diego Yacht Club. Mary and I invite you all to come see us!" . . . **Harry Weese**, practicing architecture as Harry Weese and Associates, Chicago, has been selected to set the design character for Washington, D.C.'s new subway system. In preparation, Harry visited 20 subways around the world including London's (the oldest) and Moscow's (the most grandiose). Philosophizing on subway design, Harry says, "In the state of the art, there are three very different approaches: the utilitarian, the commercial, the publicly motivated. The utilitarian provides basic engineering

with not much else. Only passing attention is given to amenities. This type can be done well, but at best it's a little wearing on the passengers. The commercial approach knits the subway stations into complexes of stores, cashing in on every square foot of rentable space. Hamburg's subway, for example, is warmed by the flame of commerce: food shops, flower shops, luggage lockers, chocolate bars. But commercial subway stations sometimes can also get a little too flashy and jangle the nerves. On the other hand, the public approach does not treat riders as captive audience. Spaces are like those in public buildings, providing a certain dignity, and sometimes even elegance. The Montreal Metro uses very fine materials and long clear spans, and in doing so it creates a 1966 public architecture near to the Moscow precedent: Gallic exuberance as compared with Russian pomposity. Both Moscow and Montreal have done a lot in their two different accents to raise the quality of subways." Harry's Washington assignment is unique in that architecture is placed on the same level as engineering; both section heads report to the administrator of the National Capital Transportation Agency.

Will Roper, Brig. Gen., has been nominated by President Lyndon B. Johnson to be a member of the Mississippi River Commission. With headquarters at Vicksburg, the commission has charge of flood control work and navigation on the lower Mississippi River and tributaries. Will is Ohio River Division Engineer, and has his own headquarters in Cincinnati. . . . **Hal McCrensky**, expanding in staff and services, moved Harold A. McCrensky and Associates, Inc., to the Park Square building, Boston. Management consultants, Hal's firm has been involved in all phases from work standards to long range planning, for clients both in the U.S. and overseas. . . . **Frank Gardner**, when the Office of Naval Research does not have him out of town, is at home with Eleanor in Sudbury. His son Tom is in high school and the only one of the four boys at home. Dick is teaching at Detroit Country Day School, Jim is a freshman at George Washington Medical School, and Dave is a freshman at Middlebury. . . . **Al Wilson** is the newly elected President of the Cambridge Chamber of Commerce. In his current activities, extra-curricular from A. O. Wilson Structural Company, Inc., he is a corporator of the Lexington Savings Bank and director of Reliance Cooperative Bank, Director of the American Leprosy Missions Inc., and the Massachusetts Council of Churches. Last year he was Vice President of the Chamber. . . . **Ken Gunkel**, Vice President Latin American Group for W. R. Grace and Company has been elected a Fellow of the American Society of Mechanical Engineers. Starting after the war with W. R. Grace in Peru, Ken moved to the New York office in 1958, and has been responsible for designing new plants or additions

to existing plants. The American Society of Mechanical Engineers grade of Fellow acknowledges engineering attainments and active practice in the profession for a total of 25 years or more. . . . Sorrowfully we note the death of **Rus Omdahl**, October 20 in Shillington, Pa. Rus had been senior engineer with the Western Electric Company. He is survived by his wife Virginia, and three children. . . . And now a final reminder that **Norm Leventhal** and **Paul Black** are looking for you! Their Reunion pitch is in your mailbox. —**Frederick J. Kolb, Jr.**, 211 Oakridge Drive, Rochester, N.Y. 14617

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For this month's column, here are some welcome replies which were sent along with Alumni Fund contributions. **Donald M. Leslie, X**, has been living in the Hague, Netherlands for the past 20 months. He is Senior Engineering Consultant for C. F. Braun and Company, Alhambra, Calif., working on a fertilizer project for Esso, the largest in the world. Don's address is c/o Braun Transworld, Surinamstraat 44, The Hague, Netherlands. . . . **Gus M. Griffin, X**, wrote that Griffin Chemical Company is diversifying into boiler chemicals, construction chemicals, and other exotic products. (Those exotic words are straight from Gus, with tongue in cheek, I presume!) . . . **Clinton R. Hilliker, XIX**, as a partner in Engineered Pavement Sealing Company, advises that his company is doing well. He has three children in college from West to East Coast—end in distant future. If you plan to visit, bring own refreshments, says Clint.

Irving Peskoe, IX-A, enclosed a clipping from the *Congressional Record* of September 12, 1967, containing remarks by Representative Fascell of Florida, complimenting Irving on good work done over a period of time, from 1962 until 1965, striving to have toll charges removed from phone calls between Miami and his home city of Homestead. After months of his dedicated work, the Public Service Commission directed Southern Bell to install trunk lines, and the new service became effective in September. Irving wrote that his area finally has gotten the kind of service it vitally needed for industrial and residential growth, and at rates that are sound. "This was one time that the technical training at Tech, combined with the legal background I acquired thereafter, all worked to good purpose."

Rear Admiral **Wellington T. Hines, XVI**, wrote "I was a Navy graduate student, graduated M.S. in Aeronautical Engineering in '39. Spent the remainder of career in Navy in Aeronautical and Weapons Engineering. Retired July 1, 1965, time now occupied in caring for three acres of lawn and gardens, revelling in being own master." —**Oswald Stewart**, Secretary, 3395 Green Meadow Circle, Bethlehem, Pa. 18017

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Your Secretary is in receipt of several notes from Classmates. From **Frank Penn, II**, comes the following: "In between looking after 6000 acres of oranges and a plant to process them in Panama, and a retail frozen concentrate processing and sales operation in Canada, I've been commuting to Rio de Janeiro and Belem this past year trying to set up a reforestation project in the lower Amazon for D. K. Ludwig and National Bulk Carriers, Inc." . . . **Rafe Martinez, II**, who is living in San Juan, Puerto Rico, would like to hear from any member of the class who happens to wander down in his direction. . . . **Ed Ashburn, XVI**, is the author of *Laser Literature*, a two volume book published in July, 1967. The book contains over 4000 references, a supplement with 1000 references is now in press. . . . **Worden Waring**, who received his Doctorate in Course V, is now an adjunct associate professor on the biomedical engineering program at the University of Southern California. . . . **Stephen Kaufman, IX-B**, has been reelected Vice President of the American Institute of Planners. . . . **W. H. Krome George, XV**, who was executive vice president of Alcoa, has been elected to the Board of Directors. . . . **Harold Wallace, XV**, has been advanced to Vice President Products Group of E.G. and G.

A recent article reports on the growth of Teledyne, Inc., a \$400,000,000 company founded seven years ago by **Henry Singleton, VI-A**, who is still Chairman of the Board. Prior to founding Teledyne in 1960, Henry was with Litton Industries for six years and built the company's electronics equipment division into a multi-million dollars a year operation. Teledyne began with the manufacture of semi-conductors and integrated circuits but rapidly expanded into many other electronic areas, and has even gone into biophysics and oceanography, as well as into other areas by acquisition of growing companies. . . . **William Leonhard, VI**, is now Senior Vice President and Assistant General Manager of the Ralph M. Parsons Company in Los Angeles, Calif. . . . **Lester Lees, IX-B**, who is professor at the Firestone Flight Sciences Laboratory, Cal Tech, delivered the von Karman Lecture at the fourth Annual A.I.A.A. meeting. His subject was "Viscous-Inviscid Flow Interactions at Subsonic and Supersonic Speeds." . . . I have the following changes of addresses to report this month: **Roy Avery**, 4321 Tarpon Lane, Alexandria, Va. 22309; **James H. Baird**, 705 Sycamore Lane, Box 3918, Wilmington, Del. 19807; **Herman Batholomay, Jr.**, 5301 N. 68th St., Scottsdale, Ariz. 85251; **Augustin Cabrera, P.O.** Box 487, Humacao, P. R. 00661; **Pedro A. de Castro**, P.O. Box 2343, San Juan, P.R. 00903; Mrs. **E. Eleanore DeMaily**, 5 Bowdoin Road, Wellesley, Mass. 02181; **Russell L. Haden, Jr.**, Ionics Corporation, 65 Grove Street, Watertown, Mass. 02178; **Marshall D. McCuen**, 9180 Haver-

stick Rd., Indianapolis, Ind. 46240; **John M. McKee, Jr.**, 6 South 574 Park Avenue, Hinsdale, Ill. 60521; **Louis V. Russoniello**, Russonello and Russonello, 521 Wyoming Avenue, Scranton, Pa. 18509; **John C. Starr**, c/o Badger Company, 363 Third St., Cambridge, Mass. 02142; **William R. Taylor, Jr.**, 3303 Valencia Rd., Tampa, Fla. 33618. —**Alvin Gutttag**, Secretary, Cushman, Darby and Cushman, American Security Building, Washington, D. C. 20005

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Rogers B. Finch, Director of Planning at Rensselaer Polytechnic Institute, was principal speaker at a round table discussion on educational opportunities leading to careers in science and mathematics held in Springfield, Mass., for the 1967 Pioneer Valley winners of the Rensselaer Mathematics and Science Award. . . . **Michael Driscoll**, Superintendent of the Department of Public Works of the town of Nantucket, belatedly reports that he has received an invitation from the Board of Trustees, the administration and the faculty of the Mapua Institute of Technology to attend the formal installation of **Oscar B. Mapua** as Second President of the Institute which took place at the J. Mapua Memorial Hall, Intramuros, Manila, Republic of the Philippines on January 29, 1967. . . . **Howard J. Samuels**, U.S. Undersecretary of Commerce and former vice president of Mobil Chemical Company, has been made Chairman for the Franklin Pierce College Library Development Campaign. . . . **Franklin W. Kolk** has been elected a Director-at-Large for a three year term of the A.I.A.A. He is Assistant Vice President for engineering research and development of American Airlines with which he has been associated since 1943. Before joining American, he was a senior aerodynamicist with the Martin Company. Although his work for the most part has been associated with advanced design planning on commercial airplanes, he has served as a flight-test engineer, general performance engineer, and airworthiness requirements specialist. An A.I.A.A. Associate Fellow, he is also a Fellow of the Royal Aeronautical Society, and chairs the S.A.E. Committee A-21 Aircraft Exterior Noise Measurement.

Lewis T. Jester, Jr., has recently moved from Schenectady, N.Y., to Marion, Ohio where he has undertaken the duties of Vice President of Marketing for Marion Power Shovel. . . . **Nathan R. Owen**, Chairman and Chief Executive of General Signal Corporation was elected a Director of the Marine Midland Corporation, a bank holding company. . . . **Wallace E. Howell** of W. E. Howell Associates, Inc., Lexington, Mass., was a speaker on "Use of Weather Modification in the Eastern United States" in a session on Weather Modification in the Eastern United States by the American Meteorological Society at the Statler Hilton in New York City last October. . . .

James W. Neighbours, retired from the U.S. Navy since 1961, now manages the Sag Harbor N.Y., plant of Grumman Aircraft Engineering Corporation. . . . **Stanley M. Smolensky**, Deputy Director, Field Center Development, N.A.S.A. Office of Manned Space Flight, Washington, D.C., was one of three associates at the A.I.A.A. fourth Annual Meeting and Technical Display making a presentation "Forecasting the Economic Impact of Future Space Station Operations." . . . Captain **Sterling H. Iverson, Jr.**, received the Legion of Merit for a tour of duty as Director of Finance, Headquarters Naval Material Command. He is now serving as Assistant Director of Budget, Department of the Navy. . . . **Charles W. Hargens, 3d**, represented M.I.T. at the Inauguration at The Dropsie College in Philadelphia last November.—**Walter J. Kreske**, Secretary, 53 State Street, Boston, Mass.; **Everett R. Ackerson**, Assistant Secretary, 16 Vernon Street, South Braintree, Mass.; **Michael Driscoll**, Assistant Secretary, 63 Centre Street, Nantucket, Mass.

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An undated newsclip reports **Frank Staszsky** is Executive Vice President of Boston Edison Company. . . . A note from **Jack Sheetz** accompanied a re-print from *Railway Age* dated September 18, 1967. It contained an interesting article about **Curt Buford's** Pittsburgh and Lake Erie Railroad Company. Curt has been President of this New York Central Railroad subsidiary for three years, and it has modernized and done very well under his leadership. . . . **Bill Dennen** is now Professor of Geology at the University of Kentucky. . . . From an article in *Printing News*; **Owen Gore** was elected President of Miehle-Goss-Dexter Corporation and has charge of all R. and D. Operations at Fairlawn, N. Y. . . . Bob Ferens, '48, writes that he traveled 26,000 miles in six weeks in west and central Africa interviewing Peace Corps and others of 10 countries for graduate fellowships in the U.S. the program was sponsored by the University Committee for International Development. . . . **Bill Kellogg**, Vice President of the American Meteorological Society is listed as having attended the Society's Summer Conference at the Naval Postgraduate School in Monterey, Calif. . . . **Hoyt Whipple** was a member of the panel recently established by the A.E.C. on Radioisotopes Licensing Review. . . . A widely noted article on the adaptive strategy for air pollution appeared in the October issue of *Bioscience*.—**Ken Rosett**, Secretary, 191 Albemarle Road, White Plains, N. Y. 10605

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25th Reunion; M.I.T. Campus; June 7-10, 1968; for reservations: **Kenneth Warden**, 10 Constitution Rd., Lexington, Mass.

The response to the mailings for our 25th Class Reunion have been terrific! We have been receiving dozens of biographies, advance registrations, and checks for class dues every week since the mailing in the middle of November, 1967. This response was expected, of course, because we are such a great class. A warning to those few who have neglected to send in their material for the Reunion Book: this month, February, 1968, is the deadline for publication. Mail now or forever regret it. . . . I received my first Christmas card this year, as all of you did I am sure, from our 25th Reunion Gift Committee. Many of you may not have noticed it, but the picture of the reindeer was in fact Class Agent, **Jim McDonough**, and the Santa Claus was **Ned Swanberg** disguised as a beaver, the role which he has assumed as Reunion Gift Chairman. . . . Remember, our Reunion is from June 7 through June 10 and it will be held in Cambridge. There are separate programs for the children, who will be housed with counselor supervision separately from the parents. As you know, this is probably the only reunion which you will attend with your children. Most of the responses to date have indicated that there will be well over 150 children there. . . . Please contact the Reunion Committee if you have any questions.—Energetic **Dick Feingold**, Secretary, Ritter and Ber-man, 266 Pearl Street, Hartford, Conn. 06103

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Paul Talalay, IX-A, 400 Overhill Road, Baltimore, Professor and Director of the Department of Pharmacology and Experimental Therapeutics, School of Medicine, Johns Hopkins University, is one of three new appointments to the National Advisory Cancer Council by the Surgeon General of the U. S. Public Health Service, according to a press release of August 22 from the U.S. Department of Health, Education, and Welfare. The appointment is for a four-year term which began last October 1. Paul joined the faculty of Johns Hopkins in 1963. He was formerly with the Ben May Laboratory for Cancer Research at the University of Chicago where he also served as Professor of Biochemistry and Medicine. . . . **Richard C. Grant**, who on July 1 became Northeastern Regional Manager of United States Envelopes (see December notes) is in the news again. He has been elected Vice President and General Manager, Northeastern and Southeastern Regions, according to a press release dated August 30. . . . *Physics Today*, October 1967, carries a review written by **Lawrence C. Biedenharn**, VIII, of the book *Lie Groups for Physicists* by Robert Hermann. A biographical note on Larry as reviewer states that he teaches at Washington University and has been active for several years in presenting scientific information to a wide audience through the St. Louis Committee for Nuclear Information. Somehow, this note does not seem to reconcile with the Alumni

Register for 1967 which lists him as a Professor of Physics at Duke University in Durham, N.C. My records indicate that Larry receives the Review. Perhaps he can tell us if there is a mistake somewhere.

I have been staying up to date through **Harold Knapp** on the Giles-Johnson rape case (see January notes). A hearing for Johnson was held November 20-21 at Annapolis, Md., following release of the Giles Brothers on October 30. However, the judge is baffled by the Supreme Court ruling in the Giles' appeal and wants the lawyers for the State of Maryland and the defendant to tell him what it means at a new hearing scheduled for January. Harold, who became involved in this case only as a private citizen outraged by injustice, wrote me a note in which he expressed optimism but regretted that Johnson had to remain in jail while Maryland jurisprudence untangles itself. Incidentally, Harold sent me much additional material after I submitted the February notes. Harold also told me that the Columbia Broadcasting System has been in touch with him. The Giles-Johnson case will form an important part of a documentary which CBS is preparing on capital punishment. . . . I have no news to report from the 25th Reunion Committee. I am about to depart for the Baltimore City Hospital for a two and one half day stay as a subject in a research program on aging conducted by the Gerontology Research Center of the National Institutes of Health. It is a life-long program under which volunteers submit to a series of tests every 18 months to determine what physiological changes have taken place. The upcoming visit is my second. There must be about 500 participants in this program which has been underway for almost 20 years. So far the program has included only men, but I understand that when the Center's new building is completed women will also be enrolled. That's all for this month.—**Paul M. Robinson, Jr.**, Secretary, Navy Information Systems Branch, Office of the Chief of Naval Operations (Op-90F), Pentagon BD770, Washington, D. C. 20350, 202-697-0264 or 7710 Jansen Dr., Springfield, Va. 22150, 703-451-8580; **Paul M. Heilman, 2d**, Assistant Secretary, Copper Development Association, 405 Lexington Ave., New York, N.Y. 10017, 212-687-6500, or 30 Ellery Lane, Westport, Conn. 06880, 203-227-3469; **John G. Barmby**, Assistant Secretary, IIT Research Institute, 1200 17th St., N.W., Washington, D.C. 20036, 202-296-1610

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Things have been even more hectic than usual for the past couple of weeks so I put my notes in the bag as I headed for the airport and now write these few words from a motel in West Virginia. . . . **William F. Coombs** has been appointed Director of Research for Bausch and Lomb and will continue to reside in Rochester. Bill has been one of the non wanderers of the class having

stayed in Rochester since leaving school. He has been associated with Eastman Kodak, University of Rochester, and since 1959 with Bausch and Lomb. . . . Some of our group who have recently moved are **John C. Martin** to 7007 Cherbours Place, Dayton, Ohio; **Harold Juckett**, 6525 Estel Drive, Worthington, Ohio; **Thomas McEvoy**, 80 Oxford Rd., New Rochelle, N.Y.; **Robert Whorf**, 377 Berwin Rd., Birmingham, Mich.; and **Phil Johnson**, 3300 Republic National Bank Towers, Dallas, Texas. . . . **Thomas Cummings**, after returning from a sabbatical in Vienna, was promoted to full Professor of Chemistry at Bradley University. **John Truxal**, Provost of the Polytechnic Institute of Brooklyn, has been appointed a member of the Joint Technical Advisory Committee sponsored by the Institute of Electrical Engineers and by the Electronic Industries Association. This group obtains and evaluates information of a technical or engineering nature relating to the radio art for the purpose of advising government, professional and industrial groups. John, among other activities, acts as an editorial consultant to McGraw Hill in Electrical Engineering and has edited or coauthored a few books.

George McLafferty of United Aircraft is another of our authors, having recently written a paper "Advanced Concepts in Nuclear Propulsion" dealing primarily with the various aspects of gaseous core nuclear rocket engines. . . . **Kevin Lynch** recently received a Special 50th Anniversary Award from the American Institute Planners for what appears to be his work and research in civic planning. . . . Our prexy **Claude Brenner** is now General Manager of E.G. and G.'s new Custom Equipment Division which produces special-purpose electronic systems. Claude has been with E.G. and G. since 1961, and will remain at the Bedford, Mass., location. In reading the news release on Claude it was interesting to me to note that he was born in the Union of South Africa. With his aeronautical engineering background, which included a stint with de Havilland in England, he represented E.G. and G. as Project Officer in Operation Swordfish, a Navy underwater nuclear test in the Pacific. Must now get to work so will sign off with the reminder please drop us a note.—**Dick O'Donnell**, Secretary, 28516 Lincoln Rd., Bay Village, Ohio 44140; **Arnold Varner**, Harvey Hubbell Company, Newtown, Conn. 06470

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20th Reunion; Harbor View, Edgartown; June 7-10, 1968; for reservations: Adolf F. Monosson, 85 Baldpate Hill Rd., Newton Center, Mass.

The first meeting of the 20th Reunion Committee was held on November 20. Attending were: Ben Brettler, Ken Brock, Dave Finnegan, Bill Katz, Leon La Freniere, Herb Lipson, Sonny Monosson, Norm Seltzer, Verity Smith, Dave Vigoda,

George Wayne, and Bob Wofsey. The 20th Reunion will be held June 7-10 at the Harbor View Edgarton, Martha's Vineyard. I quote from the minutes: "To keep the costs of the Reunion down, it was unanimously voted that we swim across in pairs—husband and wife preferred!! It didn't take very long to get volunteers for the Committees necessary . . . after the good cocktails and food we found everyone in a truly co-operative mood!! . . . Some classmates volunteered in absentia—especially the wives. If anyone would like to work on a committee, please contact the present committee heads and join them." The committee heads are: Promotion (Mailing), Ben Brettler, Ken Brock; Regional Promotion, Bob Wofsey; Treasurer, Sonny Monosson; Banquet, Dave Vigoda, Herb Marcus; Ladies Program, Wives of Bob Wofsey, Ken Brock, Norm Seltzer, Sonny Monosson; Sports, Herb Kurinsky, Herb Lipson; Indoor Program, Norm Seltzer; Souvenirs, Howard Jacobson; Statistics (Questionnaire), (Who'll volunteer?); Book, George Wayne; Registration, (We need help!); and Transportation, Leon La Freniere.

While between Chicago and Anchorage enroute to Tokyo, **Gordon Johnson** took time to write Ken Brock concerning a symposium in October on "Unconventional Photographic Systems" for which Gordon was General Conference Chairman for the sponsoring group, the Society of Photographic Scientists and Engineers. Over 800 scientists and engineers from scientific and industrial organizations throughout the U.S.A. and several foreign countries attended the symposium which was the most successful meeting of its kind ever held. In addition to the general technical papers session, sessions were held on deformable films, electrophotography, photochromic systems, unconventional silver systems and photopolymers. Six application workshops were held dealing with holography, graphic arts, reconnaissance, microfilm information display, and office copy. Gordon is President of Log Etronics, Inc., of Alexandria, Va.

Elias J. Corey, Chairman of the Harvard Chemistry Department, has received the Fritzsche Award of the American Chemical society. Dr. Corey, who is recognized as one of the world's foremost organic chemists, has synthesized the structures of many terpenes, which are essential to the cosmetics, paint, lacquer and varnish industries. . . .

Morton Deutsch, Professor of Psychology and Education at Teachers College, Columbia University, has been named recipient of the 1968 Kurt Lewin Memorial Award of the Society for the Psychological Study of Social Issues. The award is the nation's highest in the field of social psychology. . . . **Benjamin J. Brettler** has been elected a vice president of E.G. and G. Dr. Brettler's Systems Group includes several systems-oriented subsidiaries of E.G. and G. . . . **Donald H. Archer**, principal engineer at Raytheon's Santa Barbara, Calif.,

operation, is the co-inventor of an optically-fed phased array antenna, which is destined for target tracking radar systems. Don, his wife Meredith, and their two children Lauren and Donald, live at 564 Santa Angela Lane, Santa Barbara. . . . **Robert L. Stern** recently began duties as Executive Secretary of the new Committee on Public Engineering Policy, of the National Academy of Engineering. The Committee is involved in applying the growing body of scientific knowledge to meet such national problems as air and water pollution, waste removal, urban development, and high-speed transportation. He, his wife and their three children live in Washington, D.C. . . . **Clarence J. Burg** has been appointed Manager of Business Systems Development in the Data Systems division of A. O. Smith Corporation. . . . **P. V. Danckwerts**, Shell Professor of Chemical Engineering at University of Cambridge, was recently a visiting lecturer in the department of chemical and petroleum engineering at the University of Kansas. . . . **Lester Machta**, of the U.S. Weather Bureau is an exchange scientist at the British Meteorological Office at Bracknell, England. . . . **Duane S. Cooley** was co-author of a recent paper presented at a meeting of the American Meteorological Society. Both Duane and **Glenn R. Hilst** are with The Travelers Research Center, Inc., in Hartford, Conn. Glenn recently authored, "What Can We Do To Clear the Air?" which is an interesting and provocative paper on the subject of air pollution. Glenn's one mile radius hemispherical dome to provide a controlled atmosphere for a city seems to border on science fiction. Better domed than doomed I suppose.

Melvin H. Saxe is Secretary of the Boston Stein Club for the 1967-1968 season. . . . **Gordon H. Pettengill** considers his marriage to Pamela Wolfenden to be bigger news than his latest exploits in radar astronomy at Lincoln Lab. . . . **B. W. Birmingham** was recently appointed American Editor of *Cryogenics*, an international journal in low temperature science and technology. . . . **Philip M. Lally** is still with Sperry, but is about to join M.I.T. as a result of an acquisition of his division. He has one son at Duke, one a senior in high school and one in ninth grade. . . . **James A. Guida** is working in radio astronomy at Naval Research Laboratory. Is that different from radar astronomy? . . . **Albert Weis** is Chairman of Wygod, Weis, Florin, Inc., a firm of investment bankers. He has



Gordon Johnson, '48



Donald H. Archer, '48

been a member of the New York Stock Exchange for the past year. . . . **James C. Irwin** has just accepted a position as Technical Manager at the Antwerp, Belgium, plant of Union Carbide Europe. . . . **Roger Jeanty** has sent a short biography, which begins with four years of research and development at Dorr-Oliver, in Stamford, Conn., proceeds through four years as Vice President and General Manager of Inland Cement, Ltd., six years as Director and Assistant to President of the Rio Tinto group in Canada, and continues to his present position as Director and Partner of Samuel Montagu Company Ltd., London, and Managing Director of Hutchinson, S.A., Paris. The Jeantys have one son and one daughter. . . . **Aldo F. Fioravanti** writes that after 18 years in the field as a construction engineer and superintendent, and after nine moves and four children, he has settled in Rochester, N.Y., as Superintendent of Plant Operations and Construction at the University of Rochester Medical Center. He has invited any of his traveling classmates to drop in and say hello. . . . **John E. Nicholson** worked three years with American Locomotive Company, served a tour with the Army Transportation Corps, and has since served in a variety of positions with Shell Oil Company. He is now Manager of the Engineering Office at the Houston, Texas, refinery. . . . **Denman K. McNear** writes that he has two sons, Stephen one and Denman K., Jr., two. . . . We trust that by the time you read these words, you will have enjoyed a fine Christmas Holiday season and be well on your way to the best year yet. —**Richard V. Baum**, Assistant Secretary, 6711 N. 22nd. St., Phoenix, Ariz. 85016; **John T. Reid**, Assistant Secretary, 22 W. Bryant Ave., Springfield, N.J. 07081; **Robert R. Mott**, Secretary, Kent School, Kent, Conn. 06757

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Henry S. Rowen, President of the RAND Corporation, Santa Monica, Calif., has been appointed to the National Advisory Health Council by Surgeon General William H. Stewart of the U.S. Public Health Service. As a member of the Council, Henry joins a group of distinguished leaders in the fields of science, medicine, education, and public affairs, charged with providing advice to the Surgeon General on health affairs and on the activities and responsibilities of the Public Health Service. For eleven years Henry was an economist with the RAND Corporation. Then, in 1961, he was appointed Deputy Assistant Secretary of Defense. Following this, he became Assistant Director of the Budget, Bureau of the Budget. He assumed the presidency of the RAND Corporation in January of 1967. . . . **Arthur W. Willis** has been appointed Director of technical services and new product development for Continental Can Company's corrugated container division. Arthur joined Continental Can in 1966 in a management training assignment. Earlier he had been a management consultant. Because

of his new assignment, Arthur will relocate from Springfield, Mass., to the Chicago area. . . . Each year the M.I.T. Club of Mexico City sponsors a three-day Fiesta replete with fine food, tours to fascinating places and lectures by distinguished persons. This year they are going all out to beat anything they ever put on before because this is their 20th anniversary (20th Fiesta, that is). The club was founded in 1910. Total cost of the affair is \$60 per person, travel expenses not included. This year the Fiesta will occur on Thursday, Friday, and Saturday, March 14-16. Early registration is encouraged. Write: M.I.T. Club of Mexico City, Reforma 116-804, Mexico 6, D.F., Mexico.



Arthur W. Willis, '49

Personal notes reached me from six classmates this month and, as always, I particularly appreciate these messages which you have taken the trouble to write. You may have a very modest view of your newsworthiness but you would be surprised to learn how much others enjoy knowing about you. . . . **Burt Mendlin** writes that he is in corrugated container business and is manager of a container plant in Longview, Wash. He presented a paper at the Technical Association of the Pulp and Paper Industries Corrugated Container Conference at Montreal, Canada, on October 3. Burt is President of the Longview Ski Club. . . . **Roy Rayle** has been Engineering Director of the Tactical Weapons Ordnance Division of the Avco Corporation in Richmond, Ind., since 1963. He is Chairman of the Richmond Group, Dayton Section of the American Society of Mechanical Engineers. . . . **J. Ralph Huggett** is a Computer Engineer at G.E.'s Flight Propulsion Division in Lynn, Mass., doing cycle analysis work on jet engines. His wife, the former Paula Kelly whom many of us will remember as secretary to the Technology Christian Association, had a stroke five years ago but is fine now. They have three sons: Gary, 16; Kevin, 13; and Brian, 10. . . . **Warren Watters** is President of the Reilly-Benton Company, New Orleans. He is also President of the Board of Trustees of Trinity School and

Vice President of the Metropolitan Crime Commission of New Orleans. . . . **John J. Falkenberg** is Assistant Vice President in the real estate loan department of the First National Bank of Denver, Colo. . . . **Michael K. Scholnick** is Manager of Marketing for the Products Division of Wyle Laboratories in El Segundo, Calif. He lives in Palos Verdes with his wife Ann, and daughters Laura nine, Deborah eight, and Jennifer four, plus Matthew the dog who is two. Mike was formerly a field sales manager for T.R.W. Semiconductors in Lawndale, Calif., and prior to that was a district sales manager for New England Bogue Electric. Although Boston-bred, Mike loves the California weather.

Eugene Skolnikoff is the author of a thoughtful article in the *Bulletin of the Atomic Scientists*, September, 1967, entitled "Birth and Death of an Idea: Research in (Foreign) Aid." Gene is Associate Professor of Political Science at M.I.T. and author of *Science, Technology and American Foreign Policy*. The idea, which Gene reports as being just about dead, is that a respectable amount of money be devoted by the government to research in the field of foreign aid to find out how better to implement this hotly controversial part of our foreign policy. . . . A cryptic note from an unidentified journal tells us that **John J. Glover** has been named General Manager of Jefferson Chemicals, U.K., which is constructing a plant in Llanelly, Wales. A change of address slip verifies that John has indeed gone to England where he has an office at 29/30 Old Burlington St., London W1, England. . . . Our Class President, **Kemon Taschioglou**, has been named to the Finance Committee in Lincoln, Mass., where he lives. Kemon is a sales executive with Tera-dyne in Boston. In Lincoln he is a member of the Moderate-Income Housing Study Committee, and has served as district chairman for the United Fund. He is also Vice President of the Board of Directors of the Lincoln Nursery School. Kemon was Chairman of last fall's Alumni Officers' Conference in San Francisco. **Fletcher Eaton**—Secretary, 42 Perry Drive, Needham, Mass. 02192

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I can tell from the notes that I am getting that next to 1950 (the greatest ever) 1968 is going to be a "swinging" year!! **Carol Belton** is starting things off by his appointment to the newly-created position of Technical Assistant to the President of United Carbon Company. Previously Carol was with American Oil Company, Cosden Petroleum Company and Tenneco Company. . . . My good friend **Jim Kennedy** is heading Public Relations—New York, Inc., and was asking how many other Tech men have found their way into the public relations field. If you have, drop him a note. . . . Good to hear from **John Kern** again. He and his wife enjoyed Expo 67 through the kind efforts of **Gerry Fisch**—who I've also had the good fortune of seeing on occasion. John

also enjoyed his annual trek to Europe for Perkin-Elmer. John handles new product activities for their Coleman Instruments division. . . . I hear that **Don Newhouse** is General Manager of the Springfield Newspapers. Previously Don was production and business manager of the Portland *Oregonian* and the Portland *Journal*. In recognition of his years of public service in Oregon he was chosen admiral of the Astoria Regatta.

I think you would be pleased to know that one of our class is going all out to help the cause of the Peace Corps. **Dick Eccles** is in the South Pacific Islands of Western Samoa. Dick left G. E. on a leave of absence to serve for three years with his wife and their six children. He is a deputy director responsible for 190 volunteers. His work includes public health, primary education, agriculture and forestry. Dick said that for some time he and his wife have been wanting to do something that would contribute to our society on a person-to-person basis. At G. E. he was Business Manager at Lynn's River Works. Having been heavily involved in the O.E.O. Poverty Program myself, I know what he means. . . . **John McHugh** is another non-engineer type. John graduated from the University of Louisville School of Medicine in 1960. He completed his internship and pathology residency at General Hospital in 1965. And from '65 to present is Associate Pathologist at Mercy Hospital in Toledo, Ohio.—**G. N. Stilian**, Secretary, 4 Biscayne Drive, Huntington, N. Y.

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For you hi-fi enthusiasts, M.I.T. Associate Professor Amar G. Bose has come up with a speaker amplifier system which can make your living room appear eight times larger. The new system, manufactured by Bose Corporation of Natick, Mass., has a 50-watt amplifier and 22 speakers which fit into a 1/8 th sphere of two feet radius. It can be mounted in a floor or ceiling corner, and uses the walls acting like mirrors to give the illusion of a room eight times as large with a full sphere in the center. . . . **Robert B. Barclay**, his wife Evelyn, and children Allen 17, Stephen 14, and Hellen 11, are in Palos Verdes, Calif. He is with AiResearch Manufacturing Company, a division of The Garrett Corporation. . . . Colonel **James O. Cobb**, Deputy Commander of the Arnold Engineering Development Center at Norton Air Force Base, California, was awarded the Legion of Merit for exceptionally meritorious service in providing superior test facilities for the Air Force. . . . **Robert R. Evans** is Manager of the Systems Analysis and Applications Department of Laboratory for Electronics, Boston. He and his wife Marion have three children—Carolyn 9, Robert, Jr., 8, and Michael. . . . **Robert J. Foster**, Associate Professor of Physical Science at San Jose State College, has been elected to a fellowship in the Geological Society

of America. Prior to joining San Jose State College in 1961, Dr. Foster obtained his master's and doctorate degrees from the University of Washington, and taught at the University of Washington and Montana State College. . . . **Marvin E. Goody** is now with M. E. Goody and J. M. Clancy Inc., Architects in Boston. . . . **Dick Howe** is in Harrisburg, Pa., working for the Pennsylvania Department of Highways as a soils research engineer.

Margaret Irby Koenig has recently moved to the Washington D. C. area. Her husband Lt. Colonel Richard Koenig, '50, spent five months at the Armed Forces Staff College and is now assigned to the Pentagon. They were previously in Okinawa for three years with their four daughters—Barbara 14, Joan 12, Patricia 9, and Mary 5. . . . **Jack Lowen** is working on thin film, and space charge limited devices for N.A.S.A./E.R.C. in Cambridge. . . . **Robert P. Madrull** is with Du Pont Company and is now in Beaumont, Texas. He and his wife Gertrude have six children, Katherine 14, Peter 13, Kenneth 12, Nancy 9, Elizabeth 8, and Susan 3. . . . **Charles L. Miller**, Head of the M.I.T. Department of Civil Engineering, was given the 22nd, \$1,000, George Westinghouse Award of the American Society for Engineering Education. The award cited his "leadership and innovation in engineering education, research, and practice, particularly through pioneering work in the computer field." . . . **Stephen M. Nagy** is working in the M.I.T. Microanalytical Laboratory. His microanalysis of organic compounds supported two recent publications, *Chloroindoles* by James C. Powers of U.C.L.A., and *Preparation of Aspartyl Peptides* by Buchanan, Haley, Dorer, and Corcoran. . . . **David C. Pridmore-Brown** is working on wave propagation in plasmas at the Plasma Research Laboratory of Aerospace Corporation, El Segundo, Calif. . . . **Jay Rosenfield** is Manager of Quality Assurance for new products at Xerox Corporation in Rochester, N.Y. He and Barbara have five children—Kim 14, Ken 12, James 10, Amy 8, and Michael.

Howard Schwartzman has left Proctor and Gamble and is now in Elnora, N. Y., near Schenectady, doing manufacturing planning for Mohasco Industries Inc. . . . Word has just arrived of the death of **Walter Stahl** who was Director of the Biometrics Research Program of the Oregon Regional Primate Research Center in Beaverton and was known as a consultant to several Government agencies in the area of effects of radiation on the nervous system, Soviet radiation biology, biomathematics, and cybernetics. . . . **George L. Thompson** is an assistant professor in the Electrical Engineering department at R.I.T. in Rochester, N. Y. . . . Capt. **William E. Weisert**, U.S.N., NE, XIII-A, is now stationed in San Pedro, Calif. He and Marion have two children, William Jr., 16, and Joy 15. . . . **John W. Wright** received his Ph.D. from M.I.T. in 1961, and is now with the U. S. Naval

Laboratory in Washington, D.C., doing research on radar absorbent materials, electro-magnetic scattering, and backscatter from water waves. This month's news was brought to you by—**Paul G. Smith**, Assistant Secretary, 11 Old Farm Rd., N. Caldwell, N. J. 07006; **Howard L. Levinston**, Secretary, 358 Emerson Rd., Lexington, Mass. 02173; **Walter O. Davis**, Assistant Secretary, 346 Forest Ave., Brockton, Mass. 02401; **Marshall Alper**, Assistant Secretary, 1130 Coronet Ave., Pasadena, Calif. 91107

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Ed Eigel, who has successfully worn many hats at Saint Louis University as associate professor of mathematics and Assistant Dean of the Graduate School, is now serving as Acting Dean of the Graduate School. Ed and Marcia have enjoyed three years as Danforth Associates at the University, working to improve student-faculty relations. A student-sponsored Outstanding Faculty Award a year ago attested to their success in these endeavors. . . . **J. Reed Margulis** has been appointed Sales Manager of Apogee Chemicals, Inc. . . . **Alwin S. Milian, Jr.**, was recently promoted to Senior Research Chemist in the Polyolefins Division of Du Pont's Plastic Department at the Experimental Station where he will continue his research and development studies on new processes and products related to polyethylene. . . . **Robert D. Hawthorn** has joined the Shell Chemical Company as Supervisor of Process Analysis in the engineering department. . . . **P. N. Rigopoulos** helped pioneer the development of membranes and membrane processes at Amicon. . . . **Richard Hayes**, who received a Ph.D. from American University last June, is an Assistant Director of N.A.S.A.'s Electronic Research Center in Cambridge.

George Beck, Jr., '65, is serving as a Peace Corps volunteer in a Bolivian mining community. . . . **Charles Davis** has joined Raytheon's Research Division in Waltham as a principal research scientist. He will conduct research and development in the field of solid state microwave devices for application to radar, communication, and other advanced electronic systems. . . . **M. I. Nathan** helped discover a new effect in bulk crystals of germanium in studies at I.B.M. "A New Current Instability in N-type Germanium" was published in last May's I.B.M. *Journal of Research and Development*. . . . **Martin Brilliant** published his findings on the "Dynamic Response of Systems of Mutually Synchronized Oscillators" in the *Bell System Technical Journal*. . . . Professor Bernard D. Cullity '47, served on the staff for a seminar on the use of x-rays for analyzing stress in metals at Vanderbilt University last summer. . . . **Thomas Williams** is serving as Special Gifts Chairman for the Cleveland area while regional Alumni Fund Chairmen include **Eddy Hair** in the Cincinnati, Ohio, area; **Donald McGrath** in Redondo Beach, Calif.; **Arthur Kaplan** in Framingham, Mass.; **Joseph Kozol**, in

Morristown, Pa.; and Albert Ward, Jr., in Pittsburgh, Pa. . . . **Dean Jacoby, Herbert Slater, and Edward Kaszynski** received certificates of appreciation for outstanding efforts on behalf of M.I.T. in the 1967 Alumni Fund Campaign. A job well done.—**E. David Howes, Jr.**, Secretary, Box 66, Carlisle, Mass. 01741

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The temptation to let a few old clippings get even older and to pass on some recent items is too great. This is mostly news received on those wonderful Alumni Fund return envelopes that class secretaries value so. **Peter Toohy** was promoted to Manager of Distribution in the Plastics and Resins Division of Shell Chemical in September, and was planning to move to Basking Ridge, N. J., in December. . . . Since July **Ed Elizondo** has been in the Astro Division of the R.C.A. Space Center near Princeton. He's still active in sports car rallying in New Jersey, and in October won the 8th Annual Ghosttown Rally. . . . **Norman Poulin** joined the Fluid Energy Processing and Equipment Company of Hatfield, Pa., in June as Plant and General Manager. They do fine grinding of food products, chemicals, and pharmaceuticals through an air system, and also manufacture and sell the grinding equipment. He, his wife and two daughters have moved into a new self-designed home—"lots of work and no rest" (design flaws perhaps?). . . . **Dan Braddock** is in the Poughkeepsie area at I.B.M., an advisory programmer in simulation language development. . . . In East Fishkill, also with I.B.M., is **Vladimir Chernyshov**, Module Manufacturing Engineering Manager. He reports the acquisition of a wife, Luisa, in 1958, a daughter, Steffi, in 1959, a son, Dimitri, in 1960, then two more daughters, Katarina and Sophia, in 1964 and 1965. He left Transiron, where he was then division manager in rectifiers, after eight years in 1963 to join I.B.M. . . . **John Seagle** reports the arrival of his firstborn, a son, in June. He (father, not son!) received a Ph. D. in business administration from Stanford in 1967, and is Assistant Professor of Management Science at the State University of New York in Buffalo.

The **Joseph Clumpners** also greeted their firstborn, Jeffrey Karl, in June. During the spring Joe was awarded three U. S. patents for the application of high pressure jets for the rapid continuous cooling of copper and aluminum strip, and in September he became a full-time student again to complete his Ph.D. in engineering and applied science at Yale. . . . **John Rossettos** is presently Senior Staff Scientist for A.V.C.O./M.S.D. in Wilmington, Mass., and Adjunct Assistant Professor of Engineering at Boston University. During 1964 and 1967 he did research in applied mechanics as a member of the N.A.S.A. Langley Research Center, and became an Associate Fellow of the American Institute of Aeronautics and Astronautics in August, 1966. He and Joy have a two-year-old son,

Nicholas. . . . In the Boston area **John Woulbroun** was Chairman of the second symposium on Hybrid Microelectronics sponsored by I.S.M.M. and I.E.E.E., held at the Somerset Hotel in October. He is Director of the eastern region of the U. S. of the newly formed International Society for Hybrid Microelectronics. . . . In July **Gilbert Davidson** was appointed Vice President for the Educational Division of American Science and Engineering, Inc. Gil, Amy and their two children spent their summer vacation in Paris and Palma de Mallorca! . . . **Milon Essoglou** is Secretary of the M.I.T. Club in Washington, D. C., Fund Chairman for Arlington, Va., in addition to being Director of R.D.T. and E. Planning at the Naval Facilities Engineering Command in Washington. . . . Since September 1966, **Elliot Cramer** has been an associate professor at the University of North Carolina in Chapel Hill, where he is teaching graduate courses in quantitative psychology. . . . Nearby at the Duke University Medical Center **William Lehmann** is completing his final year of residency in ear, nose, and throat surgery. Best we save the news from farther west for another time perhaps.—**Mrs. J. H. Venarde** (Dell Lanier), Secretary, 16 South Trail, Wilmington, Del. 19803; **L. Dennis Shapiro**, Secretary, Aerospace Research, Inc., 130 Lincoln Street, Boston, Mass. 02135

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December class activities included another **Walt Frey** luncheon in New York. This activity continues to attract new faces as more classmates find the luncheons a good opportunity to renew some old time friendships. Earlier in the fall some of the class had used a block of tickets for the Annual New York Alumni Concert Evening at Lincoln Center. . . . In Boston, December brought the first local, non-reunion, class get together in the form of a cocktail party at the Faculty Club. Among those who attended were Kathy and **Curt Burrows**, Michele and **Ward Halverson**, **Bob Borghesani**, **Bob Kaiser**, and **John Stelling**. . . . **Ed Boggs** is Chief Soils Engineer at Capitol Engineering Corporation in Dillsbury, Pa. In addition, Ed is an aircraft commander in the Pennsylvania Air National Guard and flies C-121 Constellations. This year he is the Harrisburg Regional Chairman of the Alumni Fund. . . . **Mike Damone** has been appointed Executive Vice President of Leho Corporation, a unit of the Campbell Group which develops industrial parks in Detroit and Ohio areas. . . . The **Bob Mansperger's** annual Christmas letter from Cleveland reveals that their family had another healthy interesting year. Bob is now a senior research engineer at Warner and Swasey, specializing in fluidics.

Richard Mateles is co-author of a new book from the M.I.T. Press entitled *Biochemistry of Some Foodborne Microbial Toxins*. . . . **Bernie Patnode** has become West Coast Technical Super-



Michael G. Damone, '56 Elwood S. Wood, '56

intendent for Monsanto Company. He and Barbara and the four children now live in Santa Clara, Calif. . . . From Houston comes word that **Russ Schweickart** will be a member of the crew of the first manned Saturn 5 flight, scheduled to take place next fall. . . . The **Nelo Seklers** report the birth of their first child, a daughter, Eugenia, on Last November 2 in Caracas. . . . **Dave Shefrin** writes that he is Vice President of Computer Processing Corporation, a data processing service bureau, and holds a similar position at International Academy, a programming school; both are in Hartford, Conn. . . . **Daan Troost** reports that he is Manufacturing Manager for the Division of Components Inc., a manufacturer of miniature solid tantalum capacitors. Daan, his wife and three children have lived near Kennebunkport for two years now. . . . Peggy and **Wolf Vieth** brought forth their fourth child and second son, Mark Anthony, on November 28. . . . **Elwood Wood** has been appointed Manager of Polyfibron Printing Blankets by W. R. Grace's Dewey and Almy Division.—**Bruce B. Bredehoft**, Co-Secretary, 16 Millbrook Road, Westwood, Mass. 02090; **T. Guy Spencer, Jr.**, Co-Secretary, M.I.T., Room E19-439, Cambridge, Mass. 02139

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There are a large number of tidbits for this month. **Lawrence Holland** has been appointed Manufacturing Manager of the National Research Corporation's Equipment Division. This division is a subsidiary of the Norton Company of Worcester. Lawrence will supervise all production of standard high vacuum components and systems at the Newton plant. Before joining N.R.C. in 1965, he was the Supervisor of Metallurgical Process Services for Hamilton Standard in Windsor Locks, Conn. . . . **Morton Rosenstein** is now Manager of Marketing Research for the Metals Division of National Research Corporation. Previously Morton was Public Relations Manager of Ionics, Inc., Watertown, Mass. In his new capacity, emphasis will be on exploring new applications for tantalum, tungsten and molybdenum products. . . . **Bill Hall** has been promoted to Research Group Leader of Application Research for injection molding products. Bill joined Monsanto in 1957 in St. Louis as a technical trainee and transferred to the Springfield plant in 1961. He served as a research engineer before his latest promotion. Bill is a licensed amateur

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see page 116

radio operator. He designs and builds all of his own transmitters and receivers including a single sideband transceiver.

Harry Lee is presently Assistant Professor of Electrical Engineering at Tech. During the academic year 1962-1963 he was on leave as a Fulbright Scholar at the Royal Technical University of Denmark. . . . I had a short message from **Otis Bryan**. He advises us of the following: "I'm finishing studies for an M.S. in Research and Development Management at the University of Southern California. In September 1967, we move to Washington D. C. My new job will be Systems Analyst in the office of the Assistant Chief of Staff, Studies and Analysis, Headquarters U.S.A.F. Glenna Oaris of Farwell, Texas, and I were married in 1964. We have two boys." . . . **Julian Cherubini** has been named Sales Manager of High Voltage Engineering Corporation's new Equipment Division. In this post Julian will be responsible for national and international sales of a variety of components for particle accelerators and vacuum systems. He joined High Voltage's technical sales staff in 1961. Prior to that he served for five years as a research metallurgist at Oak Ridge National Laboratory, Oak Ridge, Tenn. . . . **Clarence Baldwin** recently reported that he was designated a Distinguished Engineering Graduate by the University of Texas at the June graduation convocation in Austin, and is presently Manager, Development Advanced Systems Technology at Westinghouse Electric Corporation, East Pittsburgh, Pa.

An article in the Pottsville *Republican* brings us the news that **Charles Murray** has joined the staff of the Department of Internal Medicine at Geisinger Medical

Center, Danville, Pa. He was an Assistant Resident in Internal Medicine at Stanford Medical Center from 1962-63. The following year he was a National Science Foundation Post-Doctoral Fellow in Endocrinology, and in 1964-65 he held an American College of Physicians Mead Johnson Residency Scholarship—both at Stanford. . . . **David Prophet**, '51, I recently learned, is now working as a research scientist in the Physical and Life Sciences Laboratory, Atmospheric Physics Section, for Lockheed in California. . . . **David Lukens** writes as follows, "Starting in July, I will be in Liberia teaching mathematics and physics at Cuttington College and helping in the primary schools there. This last year I was Vice President of the Massachusetts State Conference of the A.A.U.P., and President of the Dean Junior College Chapter of the A.A.U.P." . . . That's all for now. I would enjoy hearing more from you. I would be particularly interested, and I think others would too, in learning what any of you are doing in the political sphere at the present time. Are any of you seeking a local office or actively working for a candidate or party?—**F. L. Morefield**, Secretary, 18 Whaddon House, William Mews, London, S. W.1. England

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10th Reunion; Provincetown Inn, Provincetown; June 7-10, 1968; for reservations: Michael E. Brose, 1171 North St., Walpole, Mass.

Now that the holidays are over and the last gift exchanged, it's time to be thinking of the big holiday in June at our 10th Reunion. As these notes are written, you will have received a notice that the Reunion location has been changed to the Provincetown Inn in Provincetown on Cape Cod. Just after our first mailing, the committee had the opportunity to consider being one of the first groups to use the additional new facilities under construction at the Provincetown Inn. Obviously, we were so impressed that we decided to switch and we know you'll agree when you arrive. Some of the highlights of our new location will be: swimming, either in the huge indoor pool or at the beach, and the beach buggy dunes tour through the Cape Cod National Seashore Park. You'll be receiving your reservation form in a few weeks but in the meantime, do fill out the Class Reunion questionnaire and send it along. And, keep thinking, sun, sand and surf! Bring your wife, husband, or guest if you are single, to this tremendous 10th Reunion weekend.

We have some news from the West Coast this month. **Gary Blakely** is now with Fairchild Semiconductor in Menlo Park, Calif., where he is Plant Comptroller. Before his present position, he was in product planning. . . . As our Western Editor, **Tony Schuman** observes, "it really seems as though half the class has ended up in the financial end of the business rather than the technical." . . .

Jim Braman is still in the Air Force and now stationed in Panama. He recently spent three months in Viet Nam with a special group doing construction work on airports. While there, he managed to survive a severe shelling in Saigon. . . . **Daryl Wyckoff** has been named Vice President of Logenco, a newly formed subsidiary of Cosmodyne. Daryl has been with the parent firm for several years prior to this new promotion. . . . The Budd Company has announced the appointment of **Aaron Gellman** as Vice President, Planning. . . . **Robert Wilcox** has been appointed as the Atomic Energy Commission's Scientific Representative in Rio de Janeiro. His office will be located at the American Embassy there and he will assume responsibility for liaison with the Atomic Energy authorities of Brazil, Colombia, Ecuador and Venezuela.

Edward Krokosky has been promoted to the rank of Associate Professor at Carnegie Institute of Technology. He has been with the faculty since 1964 in the Civil Engineering Department.

Daniel Brand has been named a partner in the firm of Peat, Marwick, Livingston and Company and a principal in Peat, Marwick, Mitchell and Company, which as most of you know, is the largest accounting firm in the country. He continues, however, to practice transportation planning consulting in New England and Washington, D. C. . . . Received the following note from **William Austin**: "I am still working at Wright Field in Dayton as an Aeronautical Engineer. It is interesting, although sometimes a frustrating job. About the biggest news recently has been our twins, Ann Margaret and Jane Elizabeth, born April 11. This little windfall gave us four children, total. Wow!" . . . **Mac Jordan** has recently been promoted to Manager, Market Research and Development for Kerr-McGee Chemical Corporation. Their primary business is the marketing of plant nutrients and agricultural chemicals to the farming industry.—**Michael E. Brose**, Secretary, 1171 North Street, Walpole, Mass.; **Antonia D. Schuman**, Western Associate, 22400 Napa Street, Canoga Park, Calif.

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Larry Elman wrote to me last summer, and to give you some idea of how well organized I am, I am just now answering his letter and transmitting his news: "**Bob Walsh** is in Florida (married to a wonderful girl—they visited us a few times before they got hitched). Oscar Orringer, '61, is out of the Service and back to Tech on a Ph.D. attempt—he is the sort who will get three of them before he quits, I think. I am still at U.A.C. Research Labs doing work in copter aeroelasticity. My kids are avid swimmers—well, Robin, six, is good, while Jon, two, occasionally makes an attempt. Only other news is that I am now the Chief of Technical Research for the Connecticut Aeronautical Association (C.A.H.A.). C.A.H.A. is trying to build an air museum in Connecticut, among other things, and my job (referred to by

the Chief of one of the restoration committees as Chief Nit-Picker) is to document the validity of museum exhibits. That means research on the history of individual planes and engines and on their markings—a good example is an old straight winged jet we got off a trash heap. The U.S.N. claimed this mess only flew in Reserve use as it was obsolete before it left the factory. Well, four months of research turned up the fact that this plane had flown in a Navy Fighter Squadron, and had set a speed record. We have it on display now in its proper paint job, and even got the pilot (now an Admiral) up from Washington to dedicate the exhibit when our museum opened. Our museum includes civilian planes dating back to 1910, and balloons of local Connecticut interest—so you see military equipment is not our only interest. If you dig aviation, stop by at Bradley Field, Windsor Locks, Conn." Thanks for all the information, Larry, and sorry to be so long getting it out.

John Norris Maguire has left the Lockheed Missiles and Space Company to become Manager of the Washington, D. C. Office of C.A.C.I., an Operations Research and Computer Consulting firm. . . . **Robert Eller** is working for the Research and Development Division of A. D. Little in their Product Development Section. He and his wife Cecelia, who is assistant costume designer at the Charles Theater, are living in Cambridge. . . . **John Schaefer** is working at Philcox Ford in Palo Alto after returning from two years of teaching in Central America. . . . From **Sam Latt**: "After completing a Medical Internship at the Peter Bent Brigham Hospital, I married the former Barbara Slosberg of Brookline. We are looking forward to returning to Boston in July, 1967, after spending two years in Bethesda, Md., where I have been doing biochemical research at the N. I. H." . . . **Joe Verderber** is now Manager of Research for the Addressograph-Multi-graph Corporation in Cleveland. . . . **Philip Roth** is in the Applied Mathematics Department at the Shell Development Company. He has a two and a half year old daughter, and says that he and his wife love California (the Bay area). . . . **Bruce Karnopp** received an Sc.M. from Brown in applied math and a Ph.D. in engineering mechanics from Wisconsin; he is now Assistant Professor of Mechanical Engineering at the University of Toronto. He is married and has two sons.

Burton Goldberg is working as a city planner for A. D. Little at their branch office in San Francisco. . . . **Bob De Michaels** is Director of Automation Branch, Aerospace Sciences Division of 4th Weather Wing at Ent Air Force Base, Colo. He has a two-year old daughter, Melissa Diane, and should have another child by now. He is finishing up his Ph.D. in meteorology, at St. Louis University. . . . **Ed Haladay** is living in Baltimore, working for Rogers, Taliaferro, Kostritsky and Lamb, Architects and Planners. . . . **Cyril Pierce** received his Ph.D. in Metallurgical Engineering at Ohio State University in December 1966. He is now

Technical Manager for High Strength Metals at the Air Force Materials Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. . . . **Ed Neild** was appointed a General Partner of Eastman Dillon, Union Securities and Company, in charge of the southwestern division of the firm. . . . **Roger Townsend** married Linda Robertson of Vienna, Va., on December 31, 1966; he is now with T.R.W. Systems in Redondo Beach, Calif. . . . **Norm Bednarczyk** received his Ph.D. in Food Science from Rutgers in May 1967, and is now Senior Research Food Scientist at General Mills Central Research Laboratories in Minneapolis. . . . **Juan Liaguno Farias** writes: "I married Minerva Rivera in Guadalajara on February 2, 1963, and we spent a year in Europe at I.N.S.E.A.D. in Fontainebleau, France. Since August 1964, I have been working as Finance Manager of Nylon de Mexico, S. A., in Monterrey. We have three children, Juan three years, Carlos one and a half years and Minerva nine months." . . . **David Geisler** is working for Du Pont as Process Development Supervisor in the Martinsville Nylon Plant. He says, "We have two children—Karen and David—the latter having engineering tendencies—at least he likes to tear everything apart." . . . **Sidney Ossgkow** writes: "I was married to Joan Barbara Ginsberg on May 28, 1967, in Brooklyn, N. Y., and I am leading a wonderful married life after many years of bachelorhood." . . . Keep the news coming—send to **Linda G. Sprague**, Secretary, 345 Brookline Street, Cambridge, Mass. 02139.

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Alan Hollander died last October 7, from cancer. He was 28. Alan had been working for Addison Wesley since graduation. He is survived by his mother, Mrs. David Hollander and his brother, Frederick. I know that I speak for the Class in expressing our sorrow to Mrs. Hollander and Alan's brother. . . . I got a clipping in the mail recently with the notation "Hallelulah." The clipping, from the New York Times, said that Miss Roberta Lou Garson was engaged to our own **Mike Leis**. That was last October and since I recently got a change of address from Mike, I presume the deed has been done. Roberta Leis is a Vassar girl, '64, and has a masters from Tufts. Mike continues at the Institute trying for a doctorate, while working on the electronics of Apollo, Polaris and Poseidon missiles at the Instrumentation Laboratory. . . . Quite a few marriages recently. **Fred Hanser** was grabbed by Anne Forde (of Lynn, Mass., fame) last June. Fred was armed with a Ph.D. in Experimental Nuclear Physics from M.I.T., received in January '67. He is working for Panametrics in Waltham, Mass. He is looking at the spectra of auroral particles and "sundry other things in physics." . . . **Bill Watson** married Rita Esposito in New Haven last November 11. While Bill grey flannels it at I.B.M. as a market analyst in Yorktown, N. Y., Rita writes educational film strips. They live in White Plains, N. Y. . . . Remaining with the so-

cial scene we see that **Millard Firebaugh** married the former Miss Barbara McCleskey, of Caldwell, Idaho, on September 9. She is a graduate of the University of Utah and Gallandet College in Washington, D. C. Millard is still at the Portsmouth Naval Shipyard working on the submarine A.G.S.555 (better known as the Dolphin). Dolphin is to be a deep diving military submarine. . . . Also on September 9, **Art de la Grange** was married (don't know to whom). He says "No significant changes."

In the recent additions department we find that Karen and **Robert Katz** had a little girl, Pamela Lynn, last April. Her father is at M.I.T. going for a doctorate in the Metallurgy Department. . . . **Douglas Johnson**: "Welcomed our first baby, William, on October 5, 1967." The Johnsons live in Cleveland where Douglas is "getting established as a stockbroker with Merrill Lynch." . . . **Clarke Swannack** now has three dogs, in lieu of children he says. They have two Chihuahuas and a St. Bernard. The dogs live well. They have a beautiful "colonial style duplex." Meanwhile, Clarke and his wife Kathleen live in a World War II type Quonset hut. There they breed tropical fish. (I don't believe a word of this). On the off moment Clarke does a little experimental physics. "Expect a Ph.D. around the summer of '68, and will stay on at the newly-formed Carnegie-Mellon University in Pittsburgh to churn out publications." His wife just finished a masters in Education at the University of Pittsburgh and teaches third grade. . . . Back in November 1962, **David Wiley** married Mary Puffer. Since then they have produced two children, David two, and Katherine five months. Their father is working for the Department of Astrophysics at Princeton. He got his Ph.D. in Physics there in '66. . . . **Walter Cheever** married Cheryl Bates (doesn't say when), and moved from Sioux Falls to Durham, N.C., where he works for John D. Letimer Associates.

In January of '66 **Frank Bachner** married Jane Dunnell, Wellesley, '65. The Institute congratulated them by giving Frank a doctorate in Metallurgy the following month. Who says the Institute doesn't have heart? A year later, on the 23d of February, 1967, they had number one son, Tom. Now they all are in Washington where Frank is a captain stationed at the U.S. Army's Harry Diamond Labs. . . . **Paul Robertson** and his wife Mary Catherine adopted a little girl last June 14. Her name is Ann Alicia (use both names, says Paul). Ann Alicia is "now busy getting into everything not secured." Her father spent three and a half years with the Gemini Launch Vehicle Data Systems division of Martin in Baltimore. That program being a success, he moved on to the Systems Analysis Section of Westinghouse also in Baltimore. . . . You remember **Bob Pease**: the nice guy with the beard, the bicycle and the knapsack. I regret to report that he has gone square. He is chief Engineer at Philbrick/Nexus Research in Dedham, Mass. His specialty is Operational Ampli-

fiers and Analogue Instrumentation. And if that weren't enough he is married to a girl named Nancy and has two kids, Benjamin three, and Jonathan one. They all live in, you guessed it, suburbia: Wilmington, Mass. . . . **Seymour Turetzky** writes: "I am a councilman in the township of Parsippany-Troy Hills, N.J. I have worked for Texas U.S. Chemicals in Parsippany since graduation as a research chemist. I received an M.S. in Chemical Engineering from Stevens Tech. in 1964."

The degrees keep coming in. M.I.T. seems to have produced a class of 700 professional students. Leading the parade is **Dewey Ryu**. Both Dewey and his wife, In-Ho Lee, got theirs last June; Dewey's from M.I.T. in Biochemical Engineering, and his wife's at Harvard in Russian History. In-Ho Lee teaches at Barnard while Dewey is at the Squibb Institute for Medical Research. . . . **Anthony Kramer** has an E.E. doctorate from Stanford, received in March '67, and that was enough to get him a job with Sylvania in Mt. View, Calif. . . . **Aare Onton** writes that he "received a Ph.D. in Physics from Purdue in June 1967—worked on infrared spectroscopy of donor and acceptor impurities in silicon; started work at the I.B.M. Watson Research Center in Yorktown Heights, N.Y., in July. I am working in the general area of optical properties of semiconductors."

Earl Biven says that he finally got his M.S. in Aerospace Engineering from U.S.C.: "after many nights and about 12,000 miles of freeway driving." . . .

Ken Lemback received a Ph.D. in Biochemistry in August of 1966 and returned to the Institute for postdoctoral work.

. . . **Edward Dodson** got his Ph.D. from Stanford in 1966. Ned was one of these fellowship collectors; first he was a Sloan Fellow, then a Standard Oil Fellow. Now he is an economist with the General Research Corporation in Santa Barbara, Calif. . . . **Bill Robinson** finished up on his Ph.D. at Purdue in Biology in November of '66, and is now a postdoctorate in biophysics at the University of Wisconsin. . . . **Bill Grimmell**, who got his Ph.D. in E.E. at Michigan in December, 1965, is now working for Bell Labs in Whippany, N.J.—**Andrew Braun**, 131 Freeman Street, Brookline, Mass. 02146

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A detailed experimental and theoretical study was performed by **Larry M. Lidsky** with regard to the interaction of particles with whistler waves. He discovered that perturbation theory was inadequate and had to use exact-orbit theory. I am sure that this discovery is a great relief to all of us who have been quite concerned on this subject. . . . **Elliott J. Bayly**, my former roommate in California, writes that he has been engaged, and probably is married by now, to a girl in Minnesota. She has been studying medicine at the University of Minnesota. . . . **Joe Perkell** writes that he will finish this June at the Harvard School of Dental Medicine and will then go into the Army for two

years. He will be stationed at Fort Devens, Massachusetts (hopefully for the duration). After that he plans to return to M.I.T. to begin work in Ph.D. in Speech Physiology and Phonology. By that time he should have received his certificate as a professional degree collector. . . . **Mariin C. Poppe**, who is electronic engineer at Sedco Systems, Inc., Farmingdale, N.Y., writes that he had a son born on January 20, 1966.

David J. Bromer, who recently received his Sc.D. degree in ceramics from M.I.T., has accepted the position of Senior Scientist with the Raytheon Company, Research Division, Waltham, Mass. . . . **Charles A. Muntz** and his wife Jill announced the birth of a second son, Christopher Jay, on April 17, 1967.

Working on pattern recognition techniques at Honeywell's Systems and Research Division is **Lawrence D. Turner**. He is enjoying the Minnesota climate and outdoor life, and has had some contact with **Elliott Bayly**.

Captain **Neil K. Weatherbie** returned from assignment in the Philippines with the 1st Mobile Communications Group to attend Staff Communications Officers' Course at Keesler Air Force Base, Miss. . . . Somebody is working for I.B.M. in Miami after having served two years. in the Army at the Pentagon, which followed some time at the M.I.T. Comptroller's Data Processing office. The notes came in unsigned. . . . **David Stare** has worked for the past three years with the Baltimore and Ohio Railroad in both the Industrial Engineering and Marketing departments. He recently left B. and O. and is working with Rasselstein A.G., a large German tin plate firm. He will be stationed, initially, in the export sales office in Cologne, Germany. . . . **David L. Waltz** is working on an S.M. degree at M.I.T., which he may have received by now. He then plans to continue on towards a Ph.D., and to continue working with the artificial intelligence group, Project M.A.C.. . . **Bostwick F. Wyman**, who received his Ph.D. in mathematics in '66 from the University of California at Berkeley, is presently an instructor in math at Princeton, N.J. . . . **Kenneth R. German** should have received his Ph.D. by now from the University of Michigan in the field of Atomic Physics. . . . **Tommy J. Alexander** is with Continental Airlines as a staff engineer. . . . **John D. Cervenka** writes that he has put away his wax and surf board, after spending several years surf bumming in southern California, and is now pursuing a medical degree at the University of Minnesota. . . . **Xavier L. Simon Fenyesy** is Assistant to the Director of Planning and Development at Anderson, Clayton and Company, S.A. He is married and now living in Mexico, after two years at the Harvard Business School. He is looking forward to seeing any classmates who might be in Mexico for the Olympics. . . . Enrolled in the University of Minnesota Medical School is **Robert P. Dickey**, who expresses interest in exchanging ideas with other people now in medical school. The University of

Minnesota seems to be an attractive location for M.I.T. graduates. . . .

Eugene F. Finkin received his Ph.D. in Applied Mechanics from Rensselaer Polytechnic Institute, and is presently a senior engineering scientist at Douglas Aircraft, Santa Monica, Calif. . . . As reported in a recent issue of *Technology Review*, **Joe Rapaport** has started his own travel consulting business in New York City. He works on group travel plans, charter and also individual bookings.

Jerome Winston is at La Trobe University, Melbourne, Australia, where he is a Ph.D. candidate in mathematics under Dr. Warren Ewens. La Trobe is a brand new university, opened on March 15, 1967. . . . **John F. Banzhaf, 3d**, whom I recently wrote about with regard to his being responsible for the June decision by the F.C.C. requiring radio and T.V. stations to broadcast anti-smoking messages, has just joined the New York City firm of Watson, Leavonworth, Kelton and Taggart where he will be specializing in patent and copyright law. He recently wrote an article on computer legal problems and a mathematical analysis of reapportionment and voting problems, which was cited by the U.S. Supreme Court. He plans to testify before a Senate subcommittee in opposition to a bill which would make computer programs unpatentable. John is turning out to be the star performer of our class.

Michael F. Parlamis is currently using Critical Path Analysis to program the construction of the new 50-story National headquarters of General Motors in New York City. He worked on Critical Path as an undergraduate in civil engineering. . . . The following people attended Alumni Day last June: Keith M. Ferguson, Sheldon J. Hoffman, Philip Hudock, Robert A. Lytle, Joseph D. and Mrs. Rapaport, Richard A. and Mrs. Robnett, Bardwell C. and Mrs. Salmon, Arthur J. and Mrs. Samberg, Joseph Perkell and myself and my wife. —**Gerald L. Katell**, Secretary, 310 Hoge Building, Seattle, Wash. 98104

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5th Reunion; Harborside, Edgartown; June 7-10, 1968; for reservations: Peter T. Van Aken, 7 Hickory Lane, Belmont, Mass.

According to **Fran Dyro**, who is now an intern at the Maine Medical Center in Portland, there was a sign in front of the hotel hosting the Western Maine Alumni Meeting that read "Holiday Inn Welcomes Howard Johnson." Fran received her M.D. from the University of Maryland last June. Next year she will become a resident in neurology at Boston University Hospital. She will also be able to keep up with what's going on at the Marine Biology Labs at Woods Hole. . . . Each month the column gets shorter, so please write before it disappears altogether. Don't forget the Reunion next spring.—**Bob Johnson**, 209 East 66th St., New York, N.Y.

Below is a continuation of the information retrieved from questionnaires sent out last fall. At this point I have an equal number of names that will appear in the March issue. The order of response is determining the issue in which information appears, though I have arranged the names alphabetically. And now for the news. . . . **Andrew Achterkirchen** received his M.S.E.E. from M.I.T. in 1966, and is now living in California where he is a member of the technical staff for T.R.W. Systems. . . . **Peter Angevine** is working as group leader in the central operations labs of Dorr-Oliver, Inc., in Stamford, Conn. . . . **Edward Arnn** is a 1st lieutenant in the Air Force, working in California on space and missile systems, and going to U.C.L.A. at night. His wife Jo Ann is a biology teacher. . . . **James Bauman** is in the Navy working for Admiral Rickover in the Division of Naval Reactors, and has earned his private pilot's license. His wife Catherine teaches and watches over their two children, ages four and five. . . . **Paul Berger** is working on his Ph.D. in Industrial Management at M.I.T., and lecturing in the evenings at Babson Institute. He has earned his 2d degree brown belt in karate. . . . **David Bivins** is striving toward his Ph.D. in civil engineering at M.I.T. His wife Bonnie is a first grade teacher. . . . **Robert Blumberg** received his S.M. at M.I.T. and a M.B.A. from Harvard Business School. He is now working as a systems analyst with the Department of Defense. . . . **Douglas Browne** is at the University of Illinois working on a Ph.D. in chemistry. His wife Beverly is a research associate in zoology.

Mike Burton is expecting his Ph.D. in anthropology from Stanford this year. His wife Mia cares for their two children, ages one and three. He notes that my humble efforts at preparing a questionnaire could be improved by consulting a good anthropologist. (So guess who will be consulted at zero fee for the next one?) . . . **Leo Cardillo** has worked as a civilian with the Department of Defense for three years and is now with the C.I.A. Attending grad school at night and playing the stock market are his main interests outside of his homelife with his wife Bobbee. . . . **William Caruthers** is working on his Ph.D. in physics at Yale on a Sterling Fellowship. His wife Judi takes care of their one year old daughter. . . . **Bob Clark** is in his last year of law school at George Washington, and will join the D.C. Bar after graduation. . . . **Chris Colton** attended law school at the University of Michigan and is now working for General Precision Systems, Inc., in California. His wife Shelley is a secretary. . . . **Patricia Page Crowther** is working part-time at M.I.T.'s Lincoln Labs and spending much of her remaining time taking care of her six month old daughter. Her husband William is on the staff at Lincoln Labs. . . . **Philip Dangel** is working on his Ph.D. at M.I.T. with special emphasis on the properties of glass, ceramics and pottery. He has

learned to play the mandolin and suggests a reunion on the moon. . . . **Tom Daniel** was with the Peace Corps in Cameroon for two years and is now a high school teacher in Rochester, N.Y. His wife Barbara is also a teacher.

Donald Danielson is a post-doctoral fellow at Harvard with a Ph.D. in applied math. His wife Patricia is a teacher. . . . **Lee Davis** has been working for Standard Oil of Ohio as an analyst for new business development. He has also received his M.B.A. from Western Reserve and is working on a Ph.D. at U.C.L.A. His wife Susan is psychological consultant. . . . **Dennis Deegan** received his S.M. in metallurgy at M.I.T. and has since been working in the U.S. Steel Applied Research Lab. He's been to Australia on an exchange program and is happy being a bachelor, playing squash, and driving a Porsche. . . . **James Dorr** is working on a Ph.D. in English at the University of Indiana and is a part-time journalist for the local paper. . . . **John Drumheller** has started his own business as a partner in Ikon, Inc., a computer service bureau in Seattle. His wife is Betty Lynn. . . . **William Evers** received his M.S. from M.I.T. and is now in the Ph.D. program in aero at Cornell. His wife Barbara is a computer programmer. . . . **David Fahrland** is working for Case Systems Research Center and is going to grad school. His wife Candace does newspaper art work and cares for their two year old daughter. . . . **Lawrence Feiner** received his Ph.D. in math at M.I.T. last fall and is now an assistant professor at the University of New York in Stony Brook. . . . **Stephen Femino** is a 1st lieutenant in the Army and is a research engineer at Redstone Arsenal. His wife Paula is a secretary.

Richard Fisher received his M.B.A. at Harvard Business School and is now a management consultant for Kates, Peat, Marwick and Company in Toronto. He has become a bridge tournament champion in Ontario in his spare time. Also in his spare time he spotted the following sign seen in a Toronto delicatessen after the Arab-Israeli war: "Gamel Abdul Nasser sandwich—half tongue, half chicken." . . . **David Freeman** is working on his Ph.D. in physics at M.I.T. finding pleasure in music and reading. . . . **John Goddard** is in grad school at Northwestern. He notes that M.I.T. must still be there because he keeps getting Alumni Fund notices. . . . **Edward Graham** is working on his Ph.D. in E.E. at Carnegie and has taken up skiing and scuba diving as hobbies. His wife Barbara is also a student. . . . **L. V. Greenley** spent two years at the University of Iowa studying philosophy and psychology and is now a control engineer for Union Carbide. His chief interests are his homelife with his wife Rosalie and his active membership in the John Birch Society. . . . **Eric Greenwell** is working for a division of Battelle Memorial Institute in circuit design. His major outside interest is racing sports cars. . . . **William Hart** received his M.S. from Princeton and is now on the Technical Staff of

Aerospace Corporation in California. His wife Bonnie is a teacher. . . . **George Heeschen** is working as a dynamics engineer after having received his M.S. at the University of Southern California. His wife Margaret cares for their two sons, ages one and two. . . . **Tom Herbert** is a Ph.D. candidate in biophysics at Johns Hopkins. His wife Katharine is a student and also takes care of their two children, ages six months and one.

Stanley Hirschi is working on his Ph.D. at M.I.T. He spent two years in Germany and traveled to Russia. . . . **R. D. Hoffman** received his M.S. in Chemical Engineering from Ohio State and is now an engineer for Hooker Chemical Corporation in Niagara Falls. His wife Dianne is a nurse, both professionally and for their two daughters, ages two and three. . . . **Joseph Hollweg** is a Ph.D. candidate at M.I.T. and a research associate there. He is interested in travel and in his potential wife. . . . **Talbott Hopper** is a systems programmer for I.B.M. His wife Carol is a nurse. . . . **John Huguenin** is a project officer at the Air Force Space and Missile Systems Organization in California. He received his M.S. in aero at the University of Southern California on a part-time basis. His wife Suzanne is expecting her first child. . . . **Bert Japikse** is now a student at Cornell Law School, after receiving two S.B.'s and one S.M. at M.I.T. His wife Sandra is a secretary. . . . **Ivan Johnson** is working as a staff engineer on the Apollo Project, and spends his spare time hiking. His wife Delia is a student. . . . **Robert Johnston** is in his last year of medical school at Johns Hopkins. His wife Patti is a high school English teacher. . . . **Joseph Kasper** is working on his Ph.D. at M.I.T. in aero. His wife Patricia is a student. Joe suggests the Provincetown Inn or London for our Reunion.

Mark Lappin is working for Raytheon after further work at the University of Pennsylvania. His wife Joan is teacher. . . . **Glenn Larson** received his M.S. at George Washington and is now working at Sanders Associates in Nashua, N. H. His wife Eleanor made Glenn the father of a boy on October 24, 1967. . . . **Raymond Leanza** is a pilot in the Air Force. . . . **John Liu** is working on his Ph.D. in physics at Princeton. . . . **Ann Sarney Loomis** is working as a systems programmer for Univac. She has a son aged one, and notes on the questionnaire that her "other arrangement" is a husband. . . . **Rudolph Lorentz** is working on his Ph.D. at the University of Minnesota. . . . **Paul Lubin** is working as a research chemist at Polaroid and is attending night school at Northeastern. His wife Myrna is a nurse. . . . **Jerry Luebbbers**, our class Vice President is doing investment research for Donaldson, Lufkin and Jenrette in New York City. He notes a 10 per cent hair loss to natural causes and 10 per cent to New York City air pollution, and states his present work as follows: "Intensive efforts in the theory and practice of capitalism with special attention to the conversion of models,

academic approaches, and other intellectual resources into more liquid assets, notably cash." . . . **Clarence Malick** is a lieutenant in the Navy Reserve and is stationed in Rhode Island. He has been accepted by New England Telephone and Telegraph for a management position when he is discharged. His wife Joan is an art teacher. . . . **Marlin Pettit** is in his last year at Harvard Business School after a year of law school at Virginia. He spent last summer working on process automation in Wales, and may return there after graduation.

Douglas McCallum is working on his Ph.D. in Regional Planning at the University of North Carolina and is teaching there. His wife Janice is a community service project coordinator. . . . **Robert McKean** received his S.M. in meteorology at M.I.T. and is now a math instructor at Lincoln University in Pennsylvania. . . . **John Mertens** is about to receive his Ph.D. in math from the University of Michigan. . . . **Jeffrey Michel** is working as an engineer at Boeing in New Orleans, a disc jockey on WNOE (1060 on your dial), and a part-time grad student at Tulane. He fills his spare time by reading, writing, and participating in local church work. . . . **Duncan Miller** is working on his Ph.D. in mechanical engineering at M.I.T., and participated in an auto fatality investigation project sponsored by the Massachusetts Registry of Motor Vehicles. His wife Holly is a teacher. . . . **Gordon Nelson** is working on his Ph.D. at M.I.T. and doing industrial consulting on the side. His interesting activities outside of school are locating C.I.A. radio stations and raising a skunk. His wife Ruth is a mathematician. . . . **Herbert Norton** is working toward his Ph.D. in physics at Columbia. He suggests a formal dance at our Reunion. . . . **Mel Oliven** is working on his Ph.D. in space physics at the University of Iowa under Professor Van Allen. His wife Carol is also working on a Ph.D. . . . **Neil Orloff** received his M.B.A. from Harvard Business School and is now a second year law student at Columbia. . . . **Alton Otis** is working on his Ph.D. in computer science at the University of Illinois.

Dennis Smith received his Ph.D. in physical chemistry at Berkeley and is now doing space research there. His wife Ellen is a student and the mother of their two year old son. . . . **Peter Staecker** is working on his Ph.D. in E.E. at M.I.T. . . . **Donald Stewart** is in the Navy working in the Mine Defense Laboratory. His wife Elizabeth is expecting their first child in March. . . . **Peter Stiffler** is working for Eastman Kodak in photographic technology. His wife Mary is a second grade teacher. . . . **Michael Sullivan** is a lieutenant in the Air Force working on communications, and is presently stationed in Florida. . . . **Samuel Taub** is working on his Ph.D. in plasma physics at Brooklyn Polytechnic. His wife Gabrielle is a social worker. . . . **J. Tenenbaum** is in the Ph.D. program at Stanford and works in the Lockheed Research Labs. His wife Arlene is a student. . . . **Warren Wiscombe** is working

on his Ph.D. in math at Cal Tech. His wife Janet is a nursery school teacher. . . . **Magne Wathne** received his M.S. from M.I.T. and is now a Ph.D. candidate at Johns Hopkins. His wife Stefanie is a secretary. . . . **Ed Wolcott** received his M.B.A. from Harvard Business School and is now a project engineer for Gates Rubber Company in Colorado. Ed also teaches for an O.E.O. project. His wife Willa is a teacher. . . . **Ralph Zimmerman** received his Ph.D. in chemistry from M.I.T. and is now working for Esso Research. Aside from his homelife with his wife Nancy, he spends his spare time playing a homemade harpsichord and refereeing fencing matches. . . . And that, classmates, is all for this month.—**Ron Gilman**, Secretary, 1021 Oakmont Place Apt. 8, Memphis, Tenn. 38107

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I was recently saddened to hear of the death of Lt. **Harold Barnes**, a real gentleman and a truly outstanding member of our class. Harry was killed on May 29, 1967, when his T-38 trainer crashed at Moody Air Force Base, Ga. He and his flight instructor were participating in a cross-country flight training exercise at the time of the accident. As a major in aero and astro, he was a Dean's List student and a member of Sigma Gamma Tau Honorary. He participated in the Air Force R.O.T.C. program his four years at M.I.T., and served as secretary of the Scabbard and Blade Honorary his senior year. Harry was a member of Phi Delta Theta, and he served his fraternity and the I.F.C. in numerous capacities. I considered myself a friend to Harry Barnes, and I do not think that I can ever forget his down-to-earth charm and his eagerness for all that was good and refreshing in life. Harry had been married for less than one month at the time of his tragic death, and I am sure the entire Class joins me in expressing our deepest sympathy to his wife and parents.

Interesting news from Lt. **Bill Klepser** who is stationed at Wright-Patterson Air Force Base, Ohio. Bill is assigned to the Aeromedical Research Lab and carries the title of Development Engineer in the specialized area of remote manipulators. Bill's wife, **Eleanore Gieron Klepser**, is working for the Foreign Technology Division at Wright-Patterson. They report much interest in this column and promise to look up all members of our class who pass through the gates of their base. Bill and Eleanore passed on word that **Margaret Shork**, now Margaret Chatterton, recently gave birth to a baby girl. Margaret and her husband Howard, along with Bill and Eleanore, are just two of several couples who met and married as classmates in the Class of 1966. For the records, someone in the know fill me in on the exact number. Bill and Eleanore promise to be two of my outstanding reporters, and such help is truly appreciated. . . . Lt. **Grinnell Jones** is now stationed at Hill Air Force Base, Utah, and is presently serving as a project officer in the Service Engineering Division. . . .

Raymond Petit was promoted to Lt. J.G. recently and is serving as a ship superintendent at the Pearl Harbor Naval Shipyard. . . . **Tom Bush** is presently serving in the Marines. . . . A few words from **Jurgen Hahn** at the Harvard Business School. Jurgen says that there are about 30 members of our class who should be finishing up the M.B.A. program this June; included in the group are Rusty Epps, Joel Talley, Tom Jones, Don Schwanz, Paul Ruby, Rich Lucey, Ron Muhlenkamp, and Monty Graham among others. Jurgen plans to be married this June. . . . A separate communication from **Monty Graham** brought news of Monty's summer job on the corporate financial staff of American Metal Climax in New York City. . . . Other grad school news: **Ted Kaplan** has finished his master's at M.I.T. and is now studying toward a Ph.D. . . . **Bob Frommer** received his M.S. this past September and is continuing toward a Ph.D. in High Energy Physics at University of Wisconsin.

Robert Fila is in his second year at the Wharton School of Business and will receive his M.B.A. in May. He is currently President of the Management Sciences Club there, and he worked this past summer for R.C.A. on the design of a corporate data file and information retrieval system for planning and control of capital investments. . . . **Den Sivers** is at Berkeley in Physics. . . . **Bill Kampe** is finishing up his M.S. at the Sloan School. . . . **George Berbeco** took the former Miss Sandra Goldberg of Boston University for his wife on July 3, 1967. George is in a chemical engineering graduate program at M.I.T. and reports a recent publication in a Swiss textile journal. George can claim the most exotic honeymoon to date; he and Sandy adventured in Yugoslavia. . . . More marriages: **Barry Skeist** married Nancy Corwin this past August. Barry reports that he plans to switch out of physics and go to medical school. . . . **Bernard Mathaisel** married Miriam Jabobs of Newton Centre, Mass., and Boston University on December 1. He and Mimi honeymooned in Hawaii and now make their home in Manhattan. Bernard recently completed a five month management development program with American Airlines and is now in A.A.'s Corporate Planning Department. He reports that "the outlook is excellent with a promising career and a lovely wife."

Charles Tsiang always comes through with the best communications: "Still shooting satellites at our station situated in Patagonia. Should see the penguins on the beach! Am holding up the electrical-technical end of operations here at the station. That means our high precision time standards and radio communications systems. Amateur radio fans can find us around 14.340 mc between 0000 and 1000 GMT as LU5HG." For those of you who may have missed my previous report on Chuck, this is for real. I am trying now to make contact with Chuck via short wave, and I am sure that any of you who make the contact will find him most interesting. If

there are any other hams in the class, send on the call letters and we'll try to make some contacts for you. . . . Some news from those receiving graduate degrees with the Class of 1966: **David Egan** married Dorothy Jean Strong on August 5 in New Orleans. David is now a civil engineer with Shell Oil's Construction-Design group working on R. and D. projects for offshore structures. He is also a part-time lecturer in acoustics at Tulane University. . . . **Erol Kirayoglu** is now with the Engineering Department of Du Pont. . . . **Robert Martel** was named Manager of Operations Research for the Boston office of Price Waterhouse and Company this past June. He is also serving as a part-time faculty member of the Boston College Graduate School of Business Administration. . . . **Enrique Garcia-Carona** is working for Quimica General, S.A., a subsidiary of Celanese Chemical Corporation in Mexico, as a development engineer in charge of evaluation of new projects. . . . That's all the news for now. Keep these cards and letters rolling in.—**Gene Sherman**, Secretary, 74 Willow Terrace Apts., Chapel Hill, N. C. 27514

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Stan Rose was married to Louise Schwartz last June. He is now an electrical engineering teaching assistant at Tech. During the summer he worked for Medinet, a department of General Electric in Watertown, Mass. . . . **Mohammad Abid Ilaahi** of Lahore, West Pakistan, received the Harvard Business School James Thomas Chirurg Fellowship; the annual fellowship is available to an M.B.A. candidate who is preparing for a career in the advertising field. . . . **John Rudy**, now at Sloan, is engaged to Janice Weil, a Speech Therapy major at Emerson. The wedding is set for June, 1968. . . . **John Rible** received his second degree in September in electrical engineering and has since been working in the Socio-Behavioral Labs of the Pacific State Hospital in California. . . . **Robert Rice** has an N.S.F. Fellowship at the University of California in Berkeley. . . . Physics major **Louis Schwartzkopf** is also at Berkeley. . . . **John Schwarz** is attending the U.C.L.A. Medical School. . . . **Joseph Sullivan** is on active duty as second lieutenant in the U. S. Air Force. Joe, as an engineer in the U. S. A. F. Systems Command, is working on the Minuteman III ICM Program in Anaheim, California. . . . **Myron Sussman** is a teaching assistant at the Carnegie Institute of Technology. . . . **Larry Taggart** is attending the University of Chicago Business School. . . . **Bruce Watne** is a teaching assistant at Oregon State. . . . **Paul Weatherly** is studying biology at Yale. . . . **Ronald Webbink** has a Marshall Scholarship to attend St. John's College at the University of Cambridge. . . . **Jeff Dodson** is working at the Naval Ordnance Lab in Silver Spring, Md.

Rick Dower is attending the Harvard Graduate School of Education. . . . **Robert Dunlap** is at Cal Tech. . . . **Travis Gamble**

has a Public Health Service Traineeship at the University of Oklahoma.

Allen Gammon is a research assistant at the University of Illinois. . . . **Bob Gann** is attending the Northwestern Business School. . . . **Allan Gottlieb** is in graduate school at Brandeis. . . . **Henry Howarth** was married on the second of September and is now studying at New York University. . . . **Mark Grossman** is attending graduate school in physics at Rutgers.

Raph Moir is working for one year for the French Atomic Energy Commission doing research on controlled thermonuclear fusion. . . . **Thomas Miller** spent the summer as an electrical engineer at the U. S. Naval Ordnance Laboratory in Silver Spring, Md., and is currently in the Division of Engineering and Applied Physics of the Harvard Graduate School of Arts and Sciences. . . . **Paul Caragine** is a medical student at the New Jersey College of Medicine in Jersey City. . . . **T'ing C. Pei** is employed by the Housing and Development Administration of New York City and is in charge of the Neighborhood Facilities Multiservice Center programs. . . . **Kevin Kinsella** is a graduate student at the John Hopkins School of Advanced International Studies in Washington, D. C. Kevin writes that he resides in a splendid townhouse in Georgetown (3315 "P" St.) and that "M.I.T. grads are always welcome."

Natalie Weiss is a graduate student at the University of Chicago in the Department of Chemistry. . . . Joshua Singer, '64, is living in Boston while attending a graduate program in the medical sciences at Harvard.

Steve Douglass, **Roy Gamse**, **Gary Garmon**, **Steve Stuntz**, and **Rick Gostyla** are among those attending the Harvard Business School. Compton Award winner Douglass, and Class President Garmon were recipients of the fellowships available to graduates of M.I.T.; Rick Gostyla received the T.W.A. Air Transportation Fellowship. . . . **John Esterl** and the former Miss Ronalie Root were married in June, 1966. John is now working for his Ph.D. in Chemistry at Berkeley. . . . William Hinkle, '60, is with the New England Power Service Company in Boston. . . . **John Ebert**, **Rick Koesler**, **Rick Murphy**, and **Chet Sandberg** are living together while studying for their master's degrees at Stanford. . . . **Gary Epling** is a teaching assistant at the University of Wisconsin. . . . **Firouz Esfandiari** is an architect with Desmond and Lord. . . . **Edward Evans** has a N.S.F. traineeship in physics at the University of California at Davis. . . . **Alfonso Falco** was married June 10, 1967, and is now a design engineer with Boeing in Seattle. . . . **Thomas Gardner** is also with Boeing.

Kenneth Barbour is in graduate school at M.I.T. . . . **Sheldon Bayer** has a traineeship at Washington University. . . . **John Fittz** is a Campus Representative for the Campus Crusade for Christ.

Neal Gilman is in the Biological Chemistry Department at Harvard. . . . **Jim Gips** is a research assistant in Computer Science at Stanford. . . . **Henry Heines** has a N.S.F. traineeship at the University of Illinois.—**Jim Swanson**, Crothers Hall, Room 240, Stanford University, Stanford, Calif. 94305



Ronald R. Webbink, '67 (second from the right), is now studying theoretical astronomy as a Marshall Scholar at St. John's College of Cambridge University, England. The picture was made when he and three other Marshall Scholars toured the Palace of Westminster accompanied by

E. Hudson Davies (right), Labor Member of Parliament for Conway, N. Wales, and C.S.A. Dobson (left), Librarian of the House of Lords. (Photo: British Information Services from the Central Office of Information, London)

Course Review

V

Richard H. Boyd, B.S. Ohio State, 1951; Ph.D. in Chemistry, M.I.T., 1955, has been appointed to a full professorship in the University of Utah's Department of Chemical Engineering. The appointment was announced by the University of Utah Board of Regents on June 9, 1967. He served in the Central Research and Polychemicals Department of the E. I. duPont de Nemours and Company, Inc., from 1955 to 1962 when he joined the faculty at the University of Utah. His special responsibility will be to develop research and teaching in applied polymer science and materials research. . . .

Irving A. Breger, B.S. Worcester Polytechnic Institute 1941, in industry 1941-43; S.M. Chemistry 1944; Ph.D. XII, 1947, has been promoted to adjunct professor in the earth sciences at American University, Washington, D. C. He served as a research associate in geology for two years, 1947-49, and studied in Holland under two Fulbright awards 1949-51. A memorandum dated in late July 1967 says he has just returned from Australia where he was Guest Scientist with C.S.I.R.O Division of Coal Research, and under the auspices of the Guggenheim Fellowship program. Dr. Breger lectured in the Philippines, Japan, and Alaska. . . . **Richard P. Buck**, B.S., 1950; M.S., 1951, California Institute of Technology; Ph.D., M.I.T. 1954, has been named an associate professor at the University of North Carolina, Chapel Hill, N.C. He transferred from Beckman Instruments, Inc.

A memorandum from **Forrest W. Getzen**, B.S., Virginia Military Institute 1950, Ph.D. physical chemistry 1956, M.I.T., dated November 1967, says he has returned to North Carolina State University from Afghanistan after serving for two and one-half years as a member of the U. S. Engineering Team which is establishing an engineering school in Kabul. His assignment was to develop a support program in chemistry. Dr. Getzen was an instructor at V.M.I. from 1950 to 1951 and served in the U. S. Air Force 21 months, August 1951 to May 1953, as a 2d and 1st Lieutenant before enrolling as a candidate for the doctorate. In

1955-56 he was awarded the Allied Chemical and Dye Corporation Fellowship.

Kenneth Harbison, B.S. University of Illinois, 1961; Ph.D. in Chemistry, M.I.T. June 1966, has accepted an assistant professorship at the University of Rochester. He has been awarded a Petroleum Research Foundation grant, administered by the American Chemical Society. Dr. Harbison was a research associate in organic chemistry, June 1966-September 1967. Mrs. **Judith Harbison**, B.S. 1963, University of California at Davis, completed her requirements for the doctorate, June 1967, at M.I.T. and has accepted a position with the Eastman Kodak Company in Rochester, N. Y. . . .

Tung-Po Lin, Ph.D. in physical chemistry, September 1948, was awarded the B.Sc. degree in Chemical Engineering from National Central University, Nanking, China in July 1949. He was an assistant instructor in physical chemistry and chemical thermodynamics July 1949-February 1954 at National Taiwan University, Taiwan, when he entered M.I.T. as a candidate for the doctorate. Dr. Lin spent four years as a research chemist at the DuPont Experimental Station in Wilmington, Del., and resigned to accept a teaching position at San Fernando State College, Northridge, Calif., where he is an associate professor in the Department of Mathematics—on leave as a Visiting Professor at the University of Malaya as of September 1967. Those of you who knew him will remember him as "Palmer."

Edwin R. Loder, B.A. 1952, Utica College of Syracuse, N. Y.; Ph.D. V 1955, formerly Director of Research at Maumee Chemical Company, has joined the DuBois Chemical Division of W. R. Grace and Company. He has been promoted from deputy director of research to Director of Research. Dr. Loder served in the U. S. Navy from February 1942 to December 1947, worked as a die maker while attending Utica College and in many and varied occupations at M.I.T., assisted financially by the World War II G.I. Bill of Rights. Mrs. Loder and their four children occupied 241 Westgate West on the M.I.T. campus. Upon graduation he entered the employ of the Eastman Kodak Company as an analyst

in their Instrumentation Laboratory. . . . The Rogers Corporation, Rogers, Conn. has announced the appointment of **Francis J. McGarry** as development engineer for its Matrix Materials Products. Formerly employed by Dewey and Almy Chemical Company, McGarry received his B.S. and M.S. degrees in chemistry from Boston College in 1961 and from M.I.T. in 1965.

Robert Meltzer, S.M., M.I.T., 1944, has been named General Manager of the Special Products Division of Bausch and Lomb, Rochester, N.Y. He will be responsible for Research and Development, Engineering, Manufacturing and Marketing of B. and L.'s products in the fields of thin films, photographic, photogrammetric and military products. . . .

Douglas M. Surgenor, Dean of the School of Medicine of State University of New York at Buffalo, since 1962, has been appointed Provost of the Health Science Faculty. Dr. Surgenor, B.A., Williams College 1939; M.S., Massachusetts State College, 1941, was awarded the doctorate in chemistry in 1946. Prior to his appointment as Dean he was associated with the Harvard Medical School as an assistant professor of physical chemistry and an associate of the University Laboratory of Physical Chemistry Related to Medicine and Health. In 1960 he was appointed Head of the Department of Biochemistry at the State University of New York at Buffalo. Dr. Surgenor is an authority on the isolation and study of proteins of human plasma. . . .

Worden Waring, Ph. D. in Physical Chemistry, 1940, has been named adjunct associate professor of the biochemical engineering program at the University of Southern California. He entered M.I.T. from Cornell University, A.B., 1936, and while at M.I.T. held the highly competitive Charles A. Coffin Fellowship awarded in 1938 by the General Electric Company. His principal interest has been in research in the field of semiconductors. —**Leicester F. Hamilton**, Correspondent, M.I.T. 4-254, Cambridge, Mass. 02139

XIII-A

William Webster, M.S.'23, Chairman and Chief Executive, New England Electric System, was awarded the Atomic Energy

Commission Citation by Dr. Glenn T. Seaborg, Chairman of the A.E.C. This award was given Bill for his foresight and leadership in helping to formulate a new concept of military requirements which greatly strengthened the nuclear defenses of the nation, and for encouraging industrial participation in commercial nuclear power development. . . . **Robert C. Sprague**, M.S.'23, Chairman of the Board, Sprague Electric Company, was the subject of an article "Research or Die" in a recent issue of *Industry* magazine. R. C. is head of the largest electronics research laboratory in Massachusetts. West of Route 128, located in North Adams, the company employs an estimated 70 per cent of the adult townspeople in what was once a textile center. . . . Lieutenant Commander **W. J. Broughton**, R.C.N., N.E.'61, recently left the staff of the Engineering Officer, H.M.C. Dockyard, Halifax and is now attending a 10-month course at the Canadian Forces Staff College, Toronto. . . . On 29 November, Captain **David Saveker**, U.S.N., M.S.'46, presented a paper to the November meeting of the San Diego Section, The Society of Naval Architects and Marine Engineers on "Construction of the U.S. Navy Mk. I Deep Diving System."

At its annual meeting in New York City, the Society of Naval Architects and Marine Engineers presented the Graduate Paper Honor Prize to Lieutenants **Samuel J. Gordon**, Nav.E.'66, and **Peter T. Tarpgaard**, Class of '68, for their paper "Utilization of Propeller Shrouds as Steering Devices." The Graduate Paper Honor Prize is awarded annually for the preparation and presentation of papers of outstanding merit and originality at the student level contributing to a meeting of the Society of Naval Architects and Marine Engineers. The paper presented by Lieutenants Gordon and Tarpgaard, U.S. Navy, was delivered originally at a meeting of the New England Section, Society of Naval Architects and Marine Engineers, in October 1966. . . . Many graduates of XIII-A took an active part in the Annual Meeting of the Society of Naval Architects and Marine Engineers. Captain **S. R. Heller**, U.S.N., Sc.D.'50, was co-author of a paper entitled "Twenty Years of Research Under the Ship Structure Committee." Rear Admiral **Frank C. Jones**, M.S.'43, and Rear Admiral **L. V. Honsinger**, M.S.'32, both acted as presiding officers of Technical Sessions. Rear Admiral **J. A. Brown**, M.S.'41, was elected a Member of the Council. Among those present at the Guest Table were **Emory S. Land**, M.S.'07; **Andrew I. McKee**, M.S.'21; **Ralph K. James**, M.S.'33; **Henry A. Schade**, M.S.'28; **Marvin H. Gluntz**, M.S.'35; **William A. Brockett**, M.S.'43; **Robert E. Stark**, M.S.'48; and **Alfred H. Keil**, Head of the Department of Naval Architecture and Marine Engineering at M.I.T. Presiding at the meeting was **Donald Holden**, M.S.'31, member of the M.I.T. Corporation.

Other graduates of XIII-A seen during the two-day meeting and at the banquet

were: **Barney Oldfield**, M.S.'44, Bob Evans, M.S.'37, **Ed Arentzen**, M.S.'43, **Bert Durfee**, Nav.E.'51, all of Quincy Division, General Dynamics Corporation; **Don Kern**, Nav.E.'52, **Dick Henning**, M.S.'50, **Jack Obermeyer**, M.S.'41, **Willy Shor**, Nav.E.'49, **Bill Riblett**, Nav.E.'49, **Dick Miller**, Nav.E.'51, **Emery Grantham**, M.S.'41, all of the Naval Ship Systems Command, Washington, D.C.; **Ted Gerber**, M.S.'46, Mobil Corporation; **Stu Jones**, M.S.'46, Commander, Boston Naval Shipyard; **Monte Ballinger**, M.S.'41, Sun Shipbuilding Co.; **Skid Johnsen**, M.S.'44, and **Al Padis**, Nav.E.'51, Rosenblatt and Son, Inc.; **Buck Vincent**, Nav.E.'50, Commanding Officer and Director, Naval Ship Research and Development Center; **Dick Aroner**, M.S.'51, J.E.Bowker Association; **Bob Watts**, M.S.'33, Reynolds Metals Company; **Deke Ela**, M.S.'44, Undersea Division, Westinghouse Electric Corporation; **Hal Hilmar**, M.S.'48, **Bill Weisert**, Nav.E.'51, **Larry Mowell**, Nav.E.'49, and **Al Dunning**, M.S.'32, all of E.B. Division, General Dynamics Corporation; **C. F. Bryant**, Nav.E.'52; **J. J. Henry**, Cohasset; **Paul Speicher**, M.S.'43, Maritime Administration; Lieutenant **Peter Bergen**, R.C.N., Nav.E.'66; Commander **H. H. Otto**, Nav.E.'62, now at Headquarters R.C.N.; **Spec Reitz**, M.S.'48, Staff Commander Cruiser-Destroyer Force, Atlantic; **Thomas P. Wynkoop**, M.S.'22; **Lew Rupp**, M.S.'43, Mobil Research Development Corporation; **Hu Reece**, M.S.'41, Assistant to Secretary of S.N.A.M.E.; **Harry Simpson**, M.S.'48, Litton Industries; **Bob Rourke**, M.S.'48, Harco Engineering Division of Harbor Boat Building Company; **Hill Brooks**, Nav.E.'53, J. J. Sharp, Inc.; **Bob Hinners**, M.S.'32, Webb Institute; **Bob Desel**, Nav.E.'52, M.S.T.S.; **Francis Packer**, Nav.E.'51, now with Esso Tanker; **Schuyler Pyne**, M.S.'30; **Nathan Sonenshein**, M.S.'44, Office of Chief of Naval Material. **Phil Erkenbrack**, M.S.'48, has retired from the Navy and is now Vice-President, Technical Services of Frick Company. He and Rennie are living in Waynesboro, Pa. —**Robert E. Stark**, Correspondent, M.I.T. 5-317, Cambridge, Mass. 02139

XV

The newest Vice President of the Huntington Beach Company, California, is **Stan Dorst**, S.M.'52. In the position of Vice President in charge of engineering and operations, he will supervise the management of Huntington Center. Before joining the Huntington Beach Company in 1952, Stan served in the army and worked as a consultant to the Arthur D. Little Company. He and his wife, Nancy, have five children: Greg, Karen, Mark, Diane, and Alan. . . . **Ernest Henderson, Sr.**, '21, internationally known financier and hotel man, died of a heart attack on September 6. Thirty years ago Mr. Henderson was co-founder of the Sheraton Corporation of America, today the largest hotel system in the world. In addition to directing the operations of the Sheraton from his Boston office, he was an antique collector, amateur musician and composer, accomplished

photographer and a radio ham. . . . **S. Charles Dearstyne**, '23, has been named an associate in Kelly, Pittelko, Fritz and Forssen, Seattle and Anchorage consulting engineers. Until his retirement in 1964, Charles served as Chief Engineer of the Port of Seattle. During this time he played a significant part in the port's extensive development program. He is a registered professional engineer in Washington and California, and a fellow of the American Society of Civil Engineers.

Manuel Zymelman, S.M.'56, has received an appointment as Lecturer on Education in the Harvard Graduate School of Education. Dr. Zymelman's interests are manpower planning and human development. Since 1961 he has taught at Northeastern University and done research for the Agency for International Development on manpower planning. He is co-author of *Economics of the Firm: Theory and Practice*. . . . The appointment of **Ralph M. Kaplan**, S.M.'59, as an institutional investment analyst of Oppenheim and Company, members of the New York Stock Exchange, has been announced by Charles H. Brunie, partner in charge of the brokerage firm's institutional research department. Ralph, who will specialize in educational technology, has previously served as manager of research at Doubleday and Company, and as assistant to the president, Book Division, of the Times Mirror Company. . . . **Victor Godin**, S.M.'65, has been named Research Assistant at Harvard Business School. . . . **Theodore W. Schwenke**, S.M.'60 has been appointed Senior Scientist for Acron Corporation, Wakefield, Mass. Mr. Schwenke has been engaged in operations analysis and research at Technical Operations, Inc., and at M.I.T. since 1959. He is a member of the Operations Research Society of America. . . . **Charles H. Kriebel**, '64, is now Professor of Industrial Administration at Carnegie-Mellon University in Pittsburgh, Pa.

Chester L. Cooper, '39, has been appointed Director of the International and Social Studies Division of the Institute for Defense Analyses. The Division will conduct studies in the field of foreign affairs, national strategy, and other aspects of public policy. Dr. Cooper has had a distinguished career in international affairs. He served briefly on the I.D.A. staff in 1966 as a Senior Research Associate before being recalled to Government service to work on the question of a negotiated settlement of the Vietnam war as a Special Assistant to Ambassador-at-Large W. Averell Harriman. From 1964 to 1966 he was a member of the White House staff, under Mr. McGeorge Bundy, with responsibility for Asian affairs. Prior to his White House assignment, he held a wide variety of analytical and executive positions in the field of foreign affairs and security policy. Dr. Cooper will continue to work closely with the Department of State in an advisory capacity. **Peter J. Kaufmann**, S.M.'55, has been elected to Vice President-Manufacturing,

of Digital Equipment Corporation, Maynard, Mass. . . . **David E. Butler**, S.M.'61, has joined Bonner and Moore Associates, Inc., Houston-based consultants in computing technology and management sciences. He was formerly with Arthur Anderson and Company where he specialized in production and inventory control systems.

Sloan Fellows

Richard J. Howe, '65, has been promoted to General Manager of Production Research by Esso Production Research Company, Houston-based research affiliate of Humble Oil and Refining Company. As General Manager he will be in charge of all production research and engineering functions. Dr. Howe was formerly manager of the Drilling and Completion Division. He is a member of the A.I.M.E., and a registered professional engineer in Texas and Oklahoma. . . .

Russell C. Youngdahl, '63, has been elected a vice president of Consumers Power Company, Michigan. His responsibilities will include construction, purchasing and store operation. Mr. Youngdahl was previously executive manager of engineering and construction. . . . General Motors Corporation, Detroit, Mich., has appointed **Donald L. Boyes**, '41, as a vice president.

Command of the 6555th Aerospace Test Wing at Patrick Air Force Base, Florida has been assumed by **Herbert S. Holdsambeck**, '60. Prior to his appointment at Patrick, Colonel Holdsambeck served as Director of the space systems directorate and the ballistic missiles directorate in the Air Force Systems Command's foreign technology division at Wright-Patterson Air Force Base in Ohio. The colonel is a veteran of 23 years, served in the European Theater of operations during World War II and flew 34 combat missions as a B-17 pilot. Among his decorations are the Distinguished Flying Cross, four awards of the Air Medal and the Air Force Commendation Medal.

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In past years, separate tours have been offered for Harvard and Yale alumni. Air fare regulations for 1968 will permit intermingling of alumni on any tour, and the full program is being offered to alumni of Harvard, Yale, Princeton and M.I.T., making possible a wider choice of departure dates.

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A complete program of sightseeing will include all major points of scenic, cultural and historic interest. Among the many features will be: a tour of the canals and floating markets of Bangkok with breakfast at a waterside restaurant; an authentic Javanese "Rijsttafel" in Singapore; a launch tour of Hong Kong harbor at sunset, with dinner at a floating restaurant; visits to the Toroko Gorge and the new National Palace Museum in Taipei; a trip on the ultra-modern 125 m.p.h. express train in Japan,

as well as comprehensive tours of the cultural treasures of Kyoto, full day excursions to Nara and Nikko, and other programs, all fully described in the tour brochure.

Tour dates have been chosen to coincide with special seasonal attractions in Japan: the spring cherry blossoms and beautiful autumn leaves (Tours 1 and 3) and the famous Gion Festival in Kyoto, probably the most colorful and historic pageant in the Orient (Tour 2). Total cost is \$1499 from California, \$1699 from Chicago, \$1737 from New York and \$1747 from Boston.*

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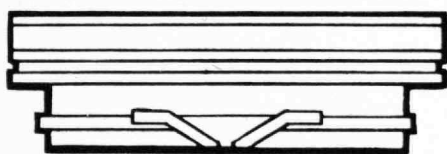
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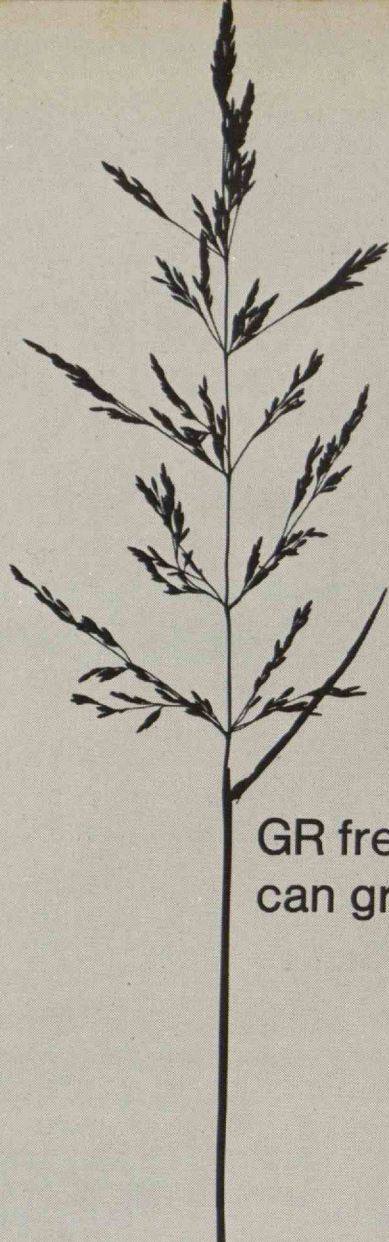
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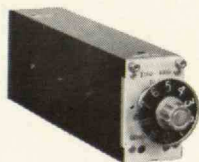
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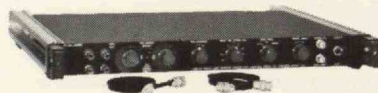
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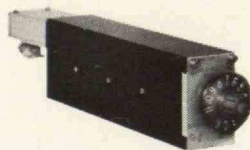
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